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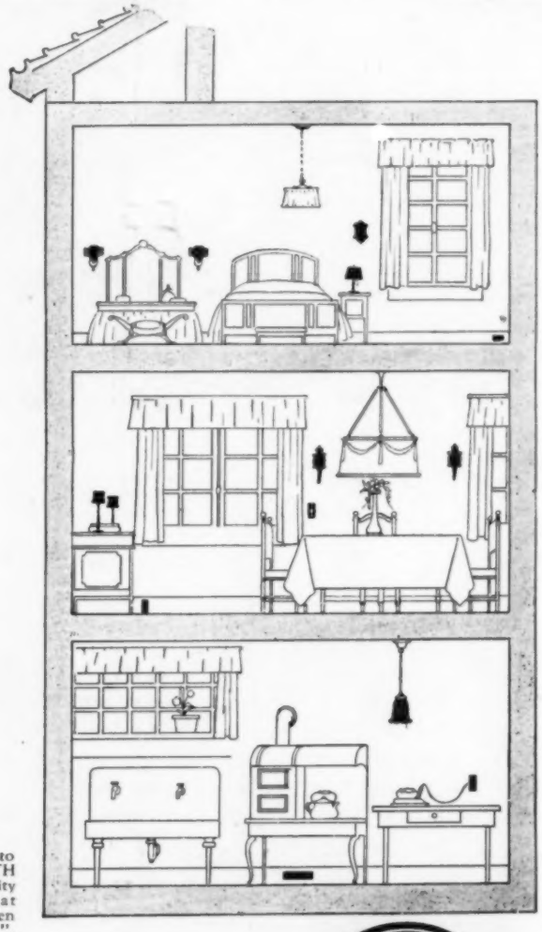

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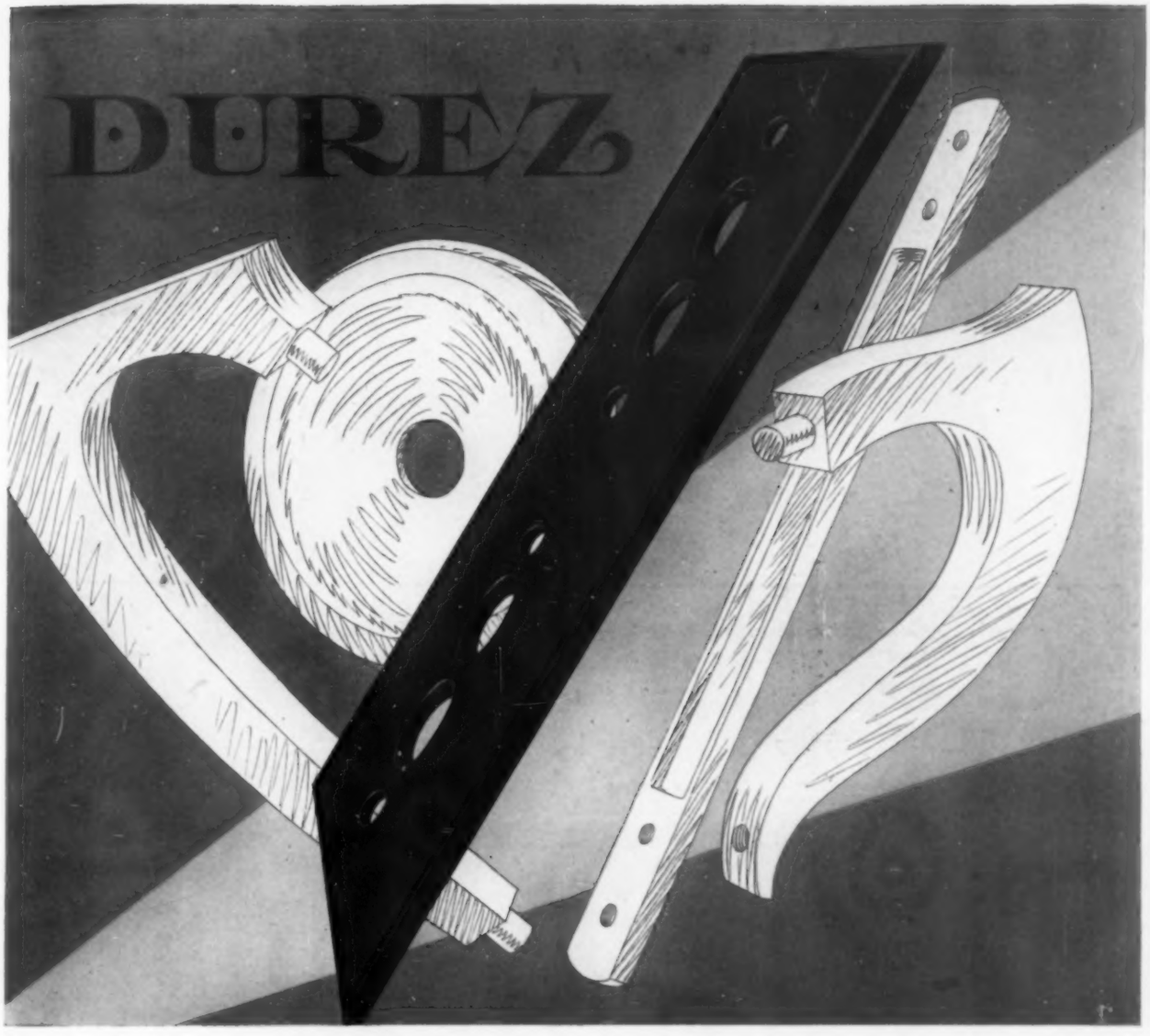

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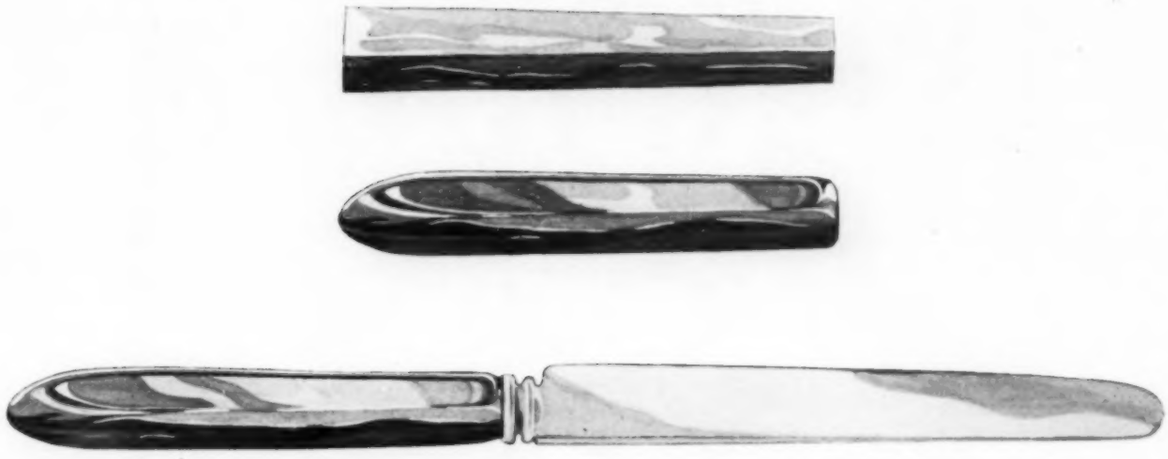

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PLASTICS
& MOLDED PRODUCTS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 5 JULY, 1927 No. 7

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Publication Office: Washington, N. J.
Offices: 471 4th Ave., New York. Telephones: Ashland 6280, 6281
SYLVAN HOFFMAN, Publisher ALAN COHEN, Adv. Director
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PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 3 JULY, 1927 No. 7

The Rainbow Hues of the Pearl

Chemical methods help solve age-old problem of producing perfect imitations of nature's products

By Dr. Walter Obst

Condensed from Kunststoffe, 1927, 17, 80.

THE attempts to produce, by artificial means, the iridescent and color effects of such natural products as mother-of-pearl and pearls, date back to the early years of the past century. Although considerable progress has been made in the past, most of the processes employed chemicals which were more or less poisonous, or the methods were entirely too expensive and difficult for commercial utilization.

Research Work

A very interesting piece of research was reported by Phani Bhusan Ganguly, in the *Journal of the (London) Chemical Society*, 1926, *p.* 1381-1385, upon the formation of mother-of pearl. To produce the iridescent effects, solutions of ordinary gelatin were treated with solutions of calcium bicarbonate, and individual drops of the mixture were allowed to evaporate upon clean glass plates. At certain areas in these drops, after drying, there were brightly iridescent effects. It is very instructive to learn that these effects are not obtainable with solutions of gum arabic, gum tragacanth, or with fish-glue. Perfectly pure ashless gelatin also failed to give the results, and they are only obtainable with the commercial grades of ordinary gelatin.

Within the past ten years, pyroxylin products that exhibit the sheen of mother-of-pearl have become exceedingly popular. Cellulose acetate has also been drawn upon for some excellent imitations.

The true play of colors, however, such as is seen on fine specimens of sea-shells, has not as yet been produced cheaply enough to become available.

The physical explanation of the phenomena of iridescence outlined in this article should prove of great interest to all who are working to produce imitations of pearls.

A microscopic examination revealed that the calcium carbonate which became deposited in the gelatin by reason of the decomposition of the calcium bicarbonate into the ordinary carbonate formed very numerous, more or less regularly deposited, parallel plates, lying at an angle of 90° to the surface. They averaged from 4000 to 6000 such little plates per centimeter. It is this structure which produces the interference colors, in this case both by interference as well as by the difraction grating that results from this structure.

More work will have to be done in this field, but there is promise of commercial possibilities, as such gelatin layers can be hardened with formaldehyde and then polished without losing the iridescence. Experiments should also be made by treating such iridescent gelatin with chromium salts followed by exposure to light, as this might lead to the rare and much desired black mother-of-pearl.

The Older Art

Many old and now expired patents were based upon the use of gelatin films for producing iridescent effects. For example, *German patent 126,675* made use of an aqueous solution of gelatin containing ammonium bromide. After drying, the films were immersed in a solution of silver nitrate, dried and then coated with collodion. Tests have shown that fairly good films with a pearly appearance can thus be made.

Methods involving the production of "marbleized" effects, such as by pouring solutions of

cellulose nitrate into water and depending upon the extremely thin film of nitrocellulose that would adhere to a substance immersed in such a bath, were also proposed, but are now praticalⁱy obsolete. The use of ox-gall, or turpentine, in connection with coloring matter for producing "marbleized" paper for bookbinding, or for edging books, is also an art that is somewhat similar, although the effects are not what one would correctly call "pearl effects."

Other methods involving the use of gelatin are likewise described, for example, by R. E. Liesegang (*Zeitschrift f. Kolloid Chemie, Vol. 12, No. 4*), where trisodium phosphate is used with the gelatin; and in the method of E. Fleck (*Dinglers Polytechnisches Journal, Vol. 231, p. 532*), and *French Patent 427,-810*. A very early process using gelatin was that described in the *Deutsche Industrie Zeitung in 1867, p. 166*, by C. Sticht, who used gelatin or isinglass solutions containing metallic salts such as calcium, silver, iron, copper or lead salts, for coating articles. After drying, the objects were subjected to hydrogen sulfide gas. According to Sticht "Very fine lamellae of the sulfides of the metals form, and thus produce the rainbow-like iridescence of the articles etc."

Other methods are still more complicated and hence hardly of any value for the development of practical processes.

Direction of Progress

As the method employing calcium bicarbonate and gelatin, referred to in the beginning of this article, is very simple, research should proceed along these lines. In this connection it might be very advisable to carry on some work with Chitin and Spongin, materials which have but recently become available. Chitin is the substance of which the shells of crustaceans is composed and a recent article describes the plastification of chitin with thiocyanate solutions. (*Plastics, March 1927, p. 109*). A material called Conchiolin, also from marine shells, is now available, and as all these substances are nearer in origin to real mother-of-pearl than is gelatin, success should crown any efforts in this direction.

In the field of glass and enamel, commercial progress has been very great, and iridescent glass is now an article of commerce, but this is outside the scope of plastic materials.

On Horn

It is also interesting that horn which has been etched until it is white, and has then been subjected to pressure so that it becomes wavy, will after etching, appear in iridescent colors. The etching solution recommended consists of 160 grams of lead nitrate in a liter of water. The horn is placed in this solution at 80° C for an hour, and is afterwards treated with a bath of iron-free hydrochloric acid, containing 5 grams of the acid per liter. A further treatment with hydrogen dioxide solution increases the iridescence.

It is peculiar that the effect is only obtained when the horn has been first pressed into a wavy form.

Iridescent effects on paper are also described. For the production of a mother-of-pearl luster on pyroxlyin plastics, the best method at present is the use of so-called "Pearl essence." Such "Pearl essence" is also suitable for treating gelatin films and the like. For this purpose the gelatin layer is hardened with a solution of 1 part of alum in 18 parts of water, dried and coated with pearl essence. An interesting recent book on this subject is one by Wobeser, entitled "*Anleitung zur Brilliant-Perlmuttermalerei und Perlmutterimitation.*"

Pearl essence, at least the more common type, consists essentially of the scale of small fishes, which contain the iridescent principle. The dried substance is then suspended in a cellulose ester lacquer, which is

(*Continued on page 342*)

Prystal---A Colorless Transparent French Plastic

By Henri Barthelemy

Chief, Research Department, La Societe Industrielle du Celluloid

From Chimie et Industrie, 1926, p. 371.

THE name Prystal as applied to the first French plastic product of urea-formaldehyde base, has the merit of brevity and will serve to recall the general properties of the polished material. Its manufacture has been realized in the factories of the Société Industrielle du Celluloid, where it originated. As the process is protected by secret patents, I am compelled to be very reserved.

Of all the plastic condensation products, Prystal is the first one to be colorless without reddening in sunlight. These very important properties allow very light, pure colors to be imparted, colors, moreover, which allow the natural gemstones to be lastingly imitated, or the creation of new, stable, decorative effects by the association of selected tints.

Like ivory, Prystal is a nitrogenous product, and there is no reason for not regarding it as a first step in the general synthesis of protein substances. As everyone knows, urea is an end product of the disintegration of the albuminoids, while Prystal recalls in many ways the properties of the casein solids.

Like the latter, the material cannot be used for high tension insulation. On the other hand, it is very well suited for the manufacture of fancy articles to be used for interior electrical fittings.

Resembles Quartz

From the viewpoint of the decorative arts, Prystal will certainly find some very suitable application for articles of fashion. In the hands of the engraver, it yields the same decorative results as hyalin quartz,

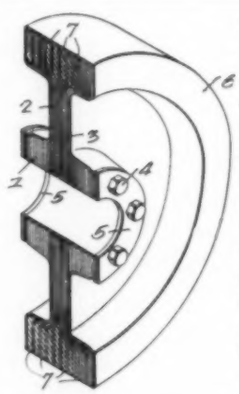
(*Continued on page 343*)

Constant Improvement in Molded Gears

Patented processes disclose short cuts in manufacturing methods that should still further extend the usefulness of silent fibrous gears

Gears have been made from phenol resins for quite a time, but new ideas on this subject are constantly cropping up. A recent patent to John M. Taylor, assignor to the Diamond State Fibre Co., (U. S. P. 1,613,489; Jan. 4, 1927) describes a noiseless gear.

The principal object of the invention is to provide a noiseless gear having a novel and advantageous distribution of sound-reducing and other materials affording economy of the former with an article of superior strength and durability.



The gear here shown is that patented to J. M. Taylor, U.S.P. 1,613,489. It is constructed particularly to run without noise and embodies several novel features in its construction and production.

Another object of the invention is to provide a noiseless gear comprising both metal and a noise-reducing material in novel and highly efficient combination.

Several embodiments of the invention are illustrated.

The figure is a sectional perspective view of a gear blank made in accordance with the invention.

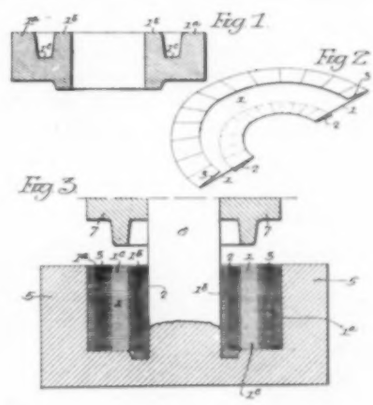
With reference to the illustration there is illustrated a gear blank in which the hub portion 1 and the web 2 consists of a number of metal plates or disks 3 bound together through the hub portion by bolts 4. Other forms of securing means may be employed, such as rivets or welding.

In the present instance, it is prefered to employ face plates 5 on the faces of the hub, which constitute seats for the head of the bolt and for the nuts, and preventing mutilation of the disks 3. Those of the disks 3 which form the web 2 are of sufficiently great diameter to extend into and through the rim portion 6 of the blank from the inner surface of the latter to the outer, the rim, however, being wider than the web portion 2. The outer portions of the disk 3 are so bent or formed as to afford a uniform distribution of these parts across the entire width of the rim. The outer rim portions of the disk 3 are perforated, and are embedded in or laminated with a suitable material, such as artificial resin or fibrous material combined with an artificial resin capable of giving the gear the desired noiseless characteristics. Although an artificial resin such as Bakelite can be used for this purpose, natural resins and other substances may be found suitable.

Artificial Resin Used

Where an artificial resin is employed, it may be applied either in its initial or intermediate stage and subjected in the usual manner to heat and pressure sufficient to convert it to its infusible final state. Instead of employing the unmixed resin, the latter may be combined with suitable fibrous material, and if desired, the rim portion may consist of a laminated structure consisting of layers of paper or fabric impregnated with the artificial resin in its hard infusible state and interspersed with the metal disks 3.

A second patent to the same inventor issued on April 5, 1927, U. S. P. 1,623,894. This comprises making a stack of resin-impregnated fabric or fiber with double thicknesses at two points as shown below.



A later patent, of the same inventor, U. S. P. 1,623,894, shows another novel way to form molded gears.

In the above illustrations shown, Figure 1 is a transverse section of a pulley constructed in accordance with the invention;

Fig. 2 is a sectional perspective view of one of the elements or pieces from which the device is made;

Fig. 3 is a sectional elevation through a mold showing the individual pieces, of which the mechanical element is composed, assembled within the mold, prior to the application of pressure, and

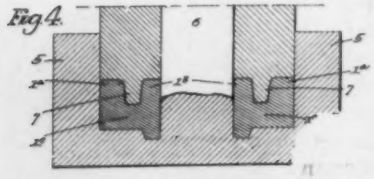
Fig. 4 is a sectional elevation, similar to that shown in Fig 3, after the application of pressure to the parts of the mold.

In carrying out Mr. Taylor's invention, there is provided a series of circular elements 1 of paper, fabric, cardboard or the like, and impregnated with a liquid phenolic condensation

product in its intermediate stage.

Each disc is provided with a flange 2 radiating from an opening at its center so that it extends outwardly parallel with and overlaps its body and the periphery of the disc is also provided with an internally extending and overlapping flange 3.

If desired, of course, the impregnation of the paper, pasteboard or other sheet elements may be deferred until after they have been flanged as above described, but this is immaterial.



Final Molding Step as shown in the Taylor patent 1,623,894

The discs made as illustrated or in form similar thereto are now placed in a relatively heavy mold in the form of a closed bottom ring 5 having at its center a suitably tapered mandrel 6 on which said discs are mounted. A plunger 7 is now introduced into the opening of the mold which is heated to a suitable temperature such as approximately 350°F. and the discs are subjected to a pressure of two thousand to three thousand pounds to the square inch. It will be noted that the plunger 7 has a bottom contour such as that which is desired the upper face of the pulley or gear blank shall possess, but it will be noted that the pile or stack of elements or sheets in the mold prior to the introduction of the plunger is considerably thicker in the flange portion 1a and likewise in the hub portion 1b than it is at the web portion 1c, because of the flanges 2 and 3. When the plunger is forced into the mold, the various parts of the laminations assume the positions shown in Fig. 1, and when the process is completed, the resultant pulley, wheel or gear blank has a hub and flange double the thickness of its web portion.

The third patent, granted on March 22, 1927, No. 1,622,116, to William B. Jaspert, assignor to Westinghouse Electric & Manufacturing Company, also covers a method for molding gears; more especially to such composite gear wheels as embody fibrous material and the well-known phenolic condensation product. This invention states that heretofore, a composite gear wheel, of the type embodying a metallic hub or support, has been formed by punching a plurality of segments or rings from fibrous sheet material, such as duck impregnated with a phenolic condensation product, and assembling such rings or segments about the outer periphery of the knurled surface of a hub or center in the matrix of a suitable mold. The assembled structure was subsequently subjected to heat and pressure to consolidate the built-up layers and from a hardened integral mass united with the metal support.

Eliminating Waste

This process produced an excessive amount of waste material amounting to approximately 35% in the punching of the segments or rings, inasmuch as the remaining material from which they were formed could not be employed for any useful purpose. Another disadvantage is the tedious methods involved in the manufacture, such as assembling the punched material in a dummy matrix and tying the assembled layers with string to permit handling the material for the purpose of charging the molds, thus involving a large amount of manual labor.

Uses Continuous Strip

Mr. Jaspert's present invention is directed to a method of forming composite gear wheels which obviates these difficulties in that the material employed is in the form of a continuous strip of fibrous material impregnated with a binding agent, such as the well known phenolic condensation product, which is fed through a corrugating die direct into the matrix of the mold, forming an endless helix of superposed layers, which are consolidated under heat and pressure in the usual manner. The corrugated strips readily adapt themselves to the annular contour of the mold, in that the material between the successive corrugations spreads at the outer or larger periphery, which constitutes the inside surface of the matrix, and is free to contract at the smaller periphery constituting the outer surface of the matrix hub member contained in the mold.

Jaspert's Method

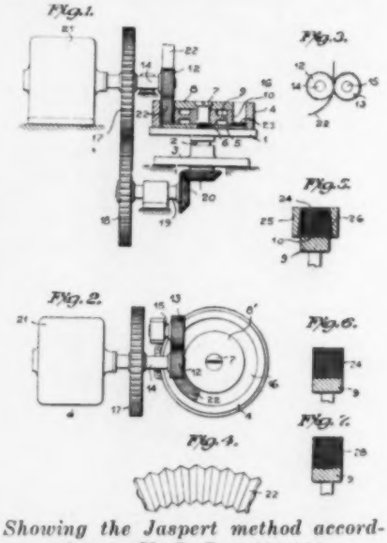
In the illustrations Figure 1 is a side elevation view, partially in section, illustrating an apparatus for practicing the process of forming composite gear wheels;

Fig. 2 is a plan view;

Fig. 3 is side elevational view of a pair of corrugating dies employed for crimping or corrugating the fibrous sheet material;

Fig. 4 is a plan view of a fragmentary portion of a strip after it has passed through the corrugated dies of Fig. 3;

Fig. 5 is a cross-sectional view of a gear wheel molded in accordance with the invention, showing a plurality of pressure rings making contact with the molded portion;



Showing the Jaspert method according to U. S. P. 1,622,116

Fig. 6 is a cross-sectional view of a fragmentary portion of a molded gear wheel; and

Fig. 7 is a cross-sectional view

(*Continued on page 344*)

Molded Electrical Insulating Material

Classification of groups according to definite standards is latest European practice

By Dr. Ing. *Sommerfeld*

In the June issue of PLASTICS, *there was detailed the scope and purpose of the article of which this is a continuation. This article is based upon a lecture delivered on April 28, 1927, before the German "Elektrotechnischer Verein" by the author.*

THE electrical insulating materials, which for the most part consist of molded products, have been classified into 10 groups or classes. The first five of these classes exhibit the same resistance to temperature (up to 150°C), and the strength diminishes with increasing numbers (as based on bending tests), the range being from 500 downwardly to about 100 kilograms. The other 5 classes show a lower resistance to heat. As all this is still tentative, it is now proposed to eliminate the classes 5 and 9, and to shift the limits of class 6, and to increase the temperature limits for class 4, and the strength requirement of class 8. Based on this tentative classification it will be possible to group the various molded insulating materials into definite types, which will eventually be based upon the practical requirements of the industry.

In testing the molded insulation, a fireproofing test is also made, but it must be stated that thus far no insulating material has been found which is absolutely incombustible.*

"Fireproof"

In tests made according to the requirements of the Verein Deutscher Ingenieure (Society of German Engineers) it was ascertained that a type of insulating material which enjoys very great popularity in countries other than Germany had to be excluded as it proved not to be fireproof. This material is a mixture of phenol resin of the general type of Bakelite when the filler consists of wood flour. However, in order not to exclude this very useful material it is expected that a revision in the requirements and a change in the present definition of what constitutes a "fireproof" material, as well as a change in the present testing methods will be made shortly.

It is hoped that as a result of the painstaking work now being done, that eventually six distinct types of molded electrical insulation will be developed. If, then, it can be found possible to persuade the manufacturers to drop all their present indefinite and non-standardized trade terms and designations and to adopt the type numbers or classes developed as the result of this work, the proper selection of the particular style of molded insulation will be easier and more certain for the engineer, molder and consumer.

Present Confusion

As an example of the confusion in the trade (i. e. in Germany) it is pointed out that over 100 different kinds of molded insulation were submitted by 29 different firms, and one firm alone had eleven different types of material. Besides this quite a few firms stood ready to make special types of molded material, and these are difficult to put into any special class.

If the projected classification is finally accomplished, the present designation used in the trade will then have a definite meaning. By means of lantern-slides the author then showed the composition of the most important types of insulating materials, such as those made of wood flour and artificial resin, artificial resins and cellulose, natural resin, asphalt and asbestos and several others. The classes into which some of the German insulating materials would fall, as based upon the heat tests and bending tests were also shown.

The Martens Test

The tests so far developed appeared to be satisfactory, except that the heat test came in for considerable criticism. The particular test known as the "Martens" test was objected to as the figures obtained with it are claimed to be entirely too low, but the author pointed out that he had experimented for a period of years with numerous other proposed heat tests for molded insulation, but had to admit that thus far at least the Martens test was still the most accurate and consistent. The advantage of the Martens test lies in that it determines the first point at which the insulation softens, and that is an important consideration.

The important effects of the kind of heat treatment that the molded products, especially such as are made from artificial resins, receive after they have been molded, and the influence of this upon the way they stand up in the test should be emphasized. One of the objections to this test, namely, that it is made on rods instead of the particular shaped articles which represent

*Possibly our German friends do not class among the plastics an inorganic composition recently developed. Editor.

the actual conditions, was answered by the author to the effect that work on this problem is now under way at the testing station at Nuremberg. He believes, however, that it will take quite a while before formulas can be worked out which will allow of transferring the data obtained from the test rods to the actual pieces with any degree of accuracy.

Standard Types

By insisting upon certain requirements which must be met when test rods of the intended insulating materials are tested, the manufacturer or molder gets some assurance that he is obtaining what he has specified, and that is a distinct step in advance of present practice.

Some particularly valuable work has recently been done by Dr. Schiff on the value of the control data obtained when testing samples of insulating material, and as a result of this work certain types of molded insulating materials are deemed to be particularly applicable to definite needs. For covers of electrical distributors, for example, type 7 is most suitable; for hand-lamps type 4, for transformers type 3. It is hoped that these types will also become standardized in the mechanical arts.

In general it can be stated that the use of heat-resistant molded insulation is considerably on the increase, but many of the products falling within classes 7 and 8 have recently been considerably improved. The physical strength of a molded object is somewhat dependent upon its shape, and it must not be assumed that the specific strength of such a product is necessarily less than that of the test-piece.

Test Pieces

Most of the manufacturers at first objected to the production of molded products in the shape of flat plates. It is pointed out that it is more economical to make otherwise flat objects with flat recesses on the reverse side and to reinforce them with ribs or metallic inserts. Despite the greater cost of making the dies and molds, the saving in material is the deciding factor. Another advantage, it is stated, lies in the fact that when molding objects otherwise flat that there is a flow of the plastic material which causes still better mixture and blending, all of which makes for greater strength in the finished product.

This additional mixing can also be accomplished by extruding the plastic material into the dies through narrow slots, and much stronger molded objects can thus be obtained than would be secured by straight molding. Materials which flow readily, such as cellulose acetate, are almost exclusively molded by such a method. For large objects, especially such as have thin walls, another method has been evolved. This comprises forcing the plastic material into the molds through an annular space surrounding the mold proper; thus employing a sort of combination of extrusion and molding. By this particular method it is possible to place metallic inserts with very little expense, and to produce molded objects which have metallic parts which protrude from the ends of the plastic mass proper, and which metallic parts can then be bent

(*Continued on page 349*)

Converting Chitin Into Plastics

By Prof. P. P. von Weimarn

From Revue Generale des Products Chimiques, 1926, 2, 743-751

(*Continued from page 284 of June Plastics*)

I should like merely to point briefly, not dealing exhaustively with the subject at this time, that, for instance, three preparations of chitin were used in our **(P. P. de Weimarn** and **S. Utzino)** experiments: chitin from the internal shell of sepia (designated as chitin S), chitin from the shells of the Japanese kind of lobsters (kumruma-ebi) (designated as chitin K), chitin from the Japanese kind of lobsters (ise-ebi), of a considerably larger size and having a considerably thicker and compacter shell than the former ones (designated as chitin I). These all gave the following inequalities for (D).

$$D_{\text{chitin S}} > D_{\text{chitin K}} > D_{\text{chitin I}}$$

Chitin S dispergates most easily and rapidly into the colloidal solution, while chitin I is dispergated slowly with the utmost difficulty into the same condition.

This difference is due not only to the history of the preparations of chitin experimented upon, but also to the different degrees of the purification of chitin from its inorganic part. In the case of chitin I, this elimination is accomplished with the most difficulty of all.

All our experiments **(P. P. Weimarn and S. Utzino)** in cellulose, fibroin, chitin, casein, fibrin and keratin dispergation, by means of concentrated aqueous solutions of readily soluble salts, brings us to the conclusion that the same range of inequalities holds for all the substances mentioned above as for instance:

$$D_{LiCNS} > D_{Ca(CNS)_2} > D_{CaCl_2} > D_{CaBr_2} > D_{CaCl_2},$$

etc. . .

Properties of Chitin Solutions

The properties of colloidal solutions of chitin in salt solutions approach in some respects those of cellulose; but the gelatinous precipitates and jellies obtained by the addition of ethyl-alcohol are, for example, of a different degree of transparency: namely they are perfectly translucent for chitin (e. g. from LiCNS-solution) and almost opaque for cellulose.

In the case of casein, it was observed—our experimental investigations being limited to heating casein with $CaCl_2$-solu-

(*Continued on page 346*)

The Manufacture of Casein Solids

VI. The important methods of forming blocks and cutting sheets are interestingly described

By Heinrich Prehn

Consulting Engineer, German Correspondent of Plastics

This is a further continuation of a series of authoritative articles that for the first time disclose the details of the manufacture of casein solids. The series began in the January issue and will be continued monthly.

THE second most important method for the production of casein solids, and a process which has won particular favor in France, is the making of solid blocks of casein, the so-called "Block-Process." The casein solids which have previously been extruded into rods, or which have been formed into strips or rough sheets, such as are produced by the malaxating rolls already described in earlier articles, or even the mixed casein powder, are used for this purpose. The appearance and mottling of the finished product differs according to the particular method chosen, and experts in this field can tell at a glance which process has been employed in manufacture.

Mottled effects exhibiting long lines or veins are obtained best by the use of the extrusion machines and the platen presses already discussed. If large, flakey and distinctively peculiar marbled effects are desired, these can best be obtained by working according to the block process. For example, the peculiar marking obtainable by cutting rods from a preformed block of casein solids by means of a suitable cutting knife can not be imitated by any other method; and the reverse is true of the types of designs obtained by the other processes. It is difficult to say which manufacturing method is preferable, and it would therefore be an ideal solution of the problem if the problem if the plant were designed for both types of operation, as this allows of very rational utilization of any scrap produced.

The blocking and cutting machines, which are special types of apparatus, are quite similar to those which have been adopted for the production of the pyroxylin plastics. The size of the blocks made varies very widely. The machine employed for the production of these blocks is a special form of press having either a single or a multi-layer pressure chamber. These machines are sometimes spoken of as Block Presses and again one hears them termed coffer or box press, or even cooking press, but the first mentioned is preferable.

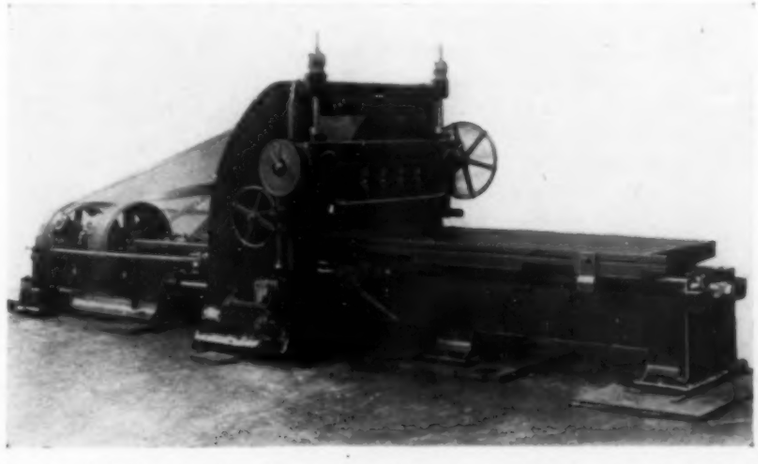


Fig. 14. A highly developed type of machine for cutting accurately dimensioned sheets from blocks of casein solid plastics. Note rigid construction.

Blocking

The pressure rod of the press, or its head, carries the pressure plate, the lower plate of the coffer or chase as well as the chase itself. All of these various parts are supported by a single flat surface so that they can not become twisted or warped. The chase or coffer also is guided in grooves or rails along the two vertical rods of the press. The movement of the press-rod forces the press plate and the chase upward, a suitably shaped head-piece, which is rigidly attached to the head of the press and which fits tightly into the press-chase, thus is brought gradually into the chase and serves to exert the necessary pressure upon the material that is undergoing treatment. The walls of this chase, the lower plate of the same, as well as the steel plate carried by the already mentioned rigid top of the press are all arranged so that they can be heated so as to furnish the necessary heat required for pressing the casein.

Expelling

The finished blocks are pushed out of the chase by four rods, while at the same time the chase is pressed downwardly by a separate pressure cylinder at the side of the headpiece of the press. After the empty chase has again been placed in position by using the low-pressure hydraulic cylinder and the rods

which served to push the block out of the chase have been withdrawn, the entire chase is ready for a second charge.

The chase is made with hollow walls so that it may be heated, and is also provided with suitable inlets and outlets for the water employed for heating. The lower and upper steel plates are provided with drilled heating channels. The type of construction described has the advantage that the blocks are turned out square and true.

Cutting Sheets

After the blocks have been formed, plates are then cut from the same on a cutting machine which is generally of the type illustrated in Fig. 14.

In purchasing such a machine, especial attention should be paid its accurate workmanship and means for precise regulation and adjustment. While not attempting to advise about any particular kind used in America an especially good machine of this type is that exemplified by one known under the name of "BAX" in Europe. The main dimensions of this particular machine are:

Length of table, 1200 millimeters (46.25″)
Width of table, 750 millimeters (29.55″)
Suitable for blocks, 900 millimeters long (35.5″)
Suitable for blocks, 550 millimeters wide (21.75″)
Maximum height beneath knife, 400 millimeters (15.75″)
Weight, approximately, 4000 kilograms. 8,800 pounds.

The best driving arrangement for the table supporting the block is a propelling or guiding screw or worm. The machine consists essentially of a heavily constructed cast iron frame upon which the heavy table glides, and of the side supports which serve to carry the cross pieces and their attachments. The table itself is guided by runners and an adjustable slide rail, so that by making the necessary adjustments an absolutely steady and accurate travel of the table can be secured.

The lubrication is taken care of by oil-rollers which are built into the track on which the table glides. The table, as already mentioned, is propelled by a screw which is made of the best open-hearth steel. This screw is supported and kept in alignment by three separate bearings having bronze bushings and which are provided with ring oilers.

To take up the axial pressure in the direction of the cutting operation, a thrust bearing with hardened surfaces is provided, while for the return movement ball bearings are employed. The very long nut in which the screw turns is babbitted and is so constructed that the babbitting can be renewed as desired, and also made adjustable so that the travel of the table supporting the block being cut will at all times be absolutely smooth and positive.

To be assured of a complete file of these valuable detailed articles on the manufacture of Casein Solids by such an accepted authority as Mr. Prehn, you should be a regular subscriber of PLASTICS. *Most of the early issues of this magazine are completely out of print.*

The propelling screw is driven from two separate pulleys running in opposite directions (one of the belts being crossed as shown in the cut), and a special clutch enables either of these pulleys to be thrown into action so that it is not necessary to shift belts to move the machine either forward or into reverse for a second cutting of a sheet from the blocks. This shifting is also taken care of automatically by means of a rod which is actuated by two tappets which are adjustably connected to the table so that the supervision of the machine is very simple.

Rigid Construction

The vertical supports which rise up on each side of the machine are so heavily constructed that all vibration is avoided.

The side uprights serve to hold the parts of the machine that support the cutting knife and its attachments. The height and angle of attack of the knife are adjustable. The adjustment is secured by means of prisms and wedges so as to secure positive action without any backlash. The adjustment of the cross-supports is by means of steel screws or spindles which run in split bronze bushings. This arrangement also makes this particular adjustment free from play.

Adjustments

The two adjusting screws or spindles are worked by means of hand-wheels and a shaft running across the machine. One wheel on one side takes care of the coarse adjustment and the other smaller wheel of the final fine adjustment of the knife. The shaft driven by this wheel transmits its motion through a pinion. Besides this there is a third, automatic adjustment which is actuated by the machine itself and which can be closely regulated to advance or rather lower the cross-support of the machine for a definite and predetermined distance so as to cut sheets of accurately controlled thickness. The adjustability lies between as little as 0.025 millimeters and up to 5 millimeters, by steps of 0.025 millimeters. The actual state of adjustment is indicated by a scale and pointers which are plainly visible on the cut. Final adjustment of the angle of incidence of the cutting knife is accomplished by means of set screws.

Accuracy

The casein sheets cut by means of such a machine are absolutely accurate and even in thickness, and both surfaces are accurately parallel. The heavy construction and accurate operation of such a machine also makes it possible to produce much thinner plates than could possibly be made by any other process. Another great advantage is that plates of different thicknesses can be cut from the same block of material, so that the color effects or marbling will be the same. This enables

(*Continued on page 348*)

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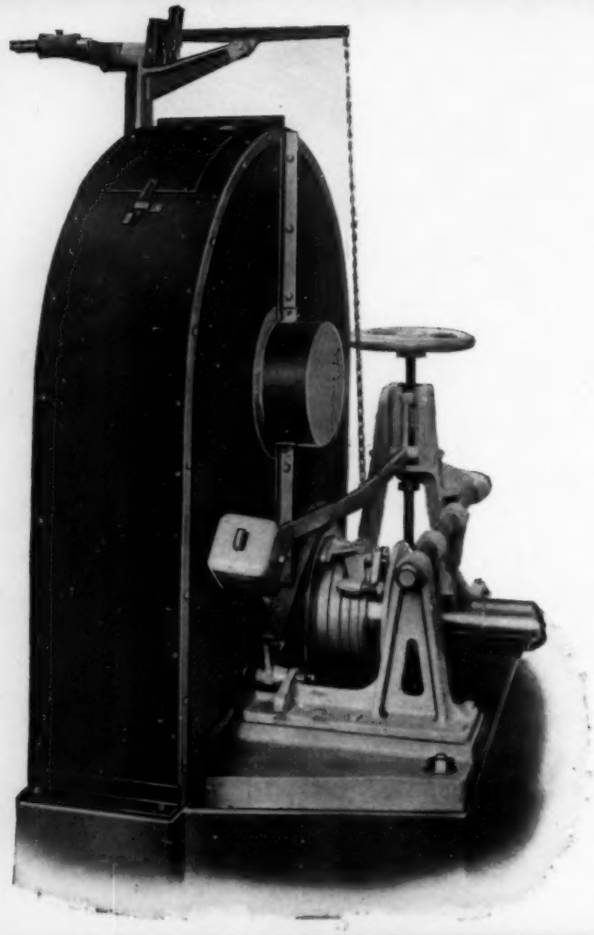

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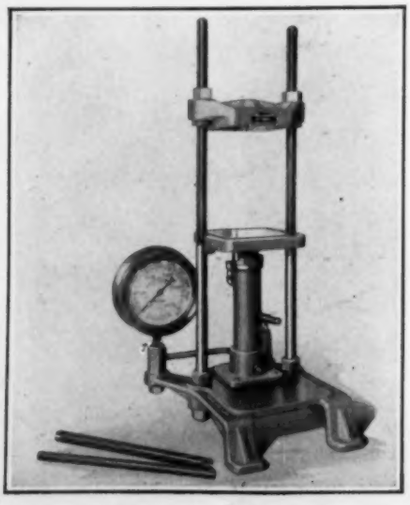

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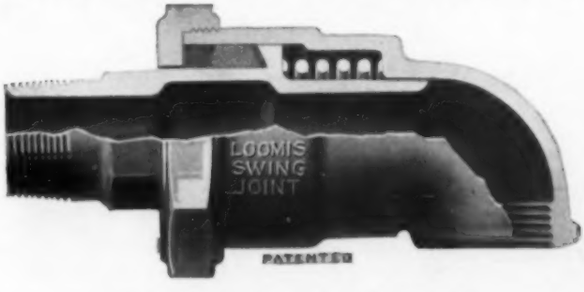

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A MODERN "DAIRY MAID"

Shows Versatility Of Casein

(*Photo by Acme*)

"*THIS young lady is dressed entirely in milk, or more correctly in casein products, a material obtained from skim milk. Because of the growing demand for cream, there is a growing surplus of skim milk. The chemists found that the casein solids contained in the latter could be converted into artificial silks, artificial jet and amber combs, tortoise shell jewelry, leather substitutes, and other articles of attire, as well as a variety of other products of great utility. The photo represents Miss Edyth Casselman at a recent Los Angeles dairy show.*"

So runs the caption to the photograph nearby which appeared in a recent Sunday issue of *New York Herald Tribune*. While there appears to be some doubt as to the possibility of a complete casein costume, there seems no possible doubt whatever that her comb, earrings, beads, bangles and shoe-buckles are made of casein solid. In fact, even the ornamentation on her dress may consist of indurated casein.

The growing vogue for highly colored beads, especially of fairly large size is an excellent outlet for casein solids.

Shoe buttons are also made from this material, and the recently patented methods for combining casein with rubber and with pyroxylin open up still further interesting possibilities.

Rubber and Casein Combined in Plastic

Co-precipitation of rubber latex and casein produces material that can be molded

FORMERLY, most of the rubber imported into this country was in the form of smoked stock; that is to say, it consisted of the rubber itself which had been produced from the latex or sap of the rubber trees by a process of heating and treating with various chemicals, such as acetic acid, to precipitate the crude rubber, which was then further treated with smoke, or with other chemicals.

Within the past decade, the importation of stabilized liquid rubber latex has been found both possible and profitable, and a great deal of natural rubber latex is being shipped in to the various rubber factories.

While most of this latex is worked up into rubber goods, and some of it directly into shoe-soles and into waterproof fabrics, a recent invention describes the combination of casein with rubber latex to produce a new plastic material which has some of the desirable properties of both the casein and the rubber, and some valuable properties of its own.

Casein Plus Latex

Arthur Biddle, the inventor, who has assigned his process to the United Products Corp. (U. S. P. 1,607,585) says that to produce the material 100 parts of casein, an alkaline solvent comprising from 10 to 30 parts of lime and from 2 to 15 parts of sodium fluoride in 200 to 300 parts of water, are mechanically mixed until the casein has dissolved, whereupon 500 parts of rubber latex are added. A creamy homogeneous mass is said to result. This is then precipitated by means of a small amount (2 to 10 parts) of sulfuric acid which has been somewhat diluted with water.

The plastic material precipitates in wet granular form, and the mother liquor can be poured off and the material pressed until almost dry. It can then be worked and molded into shape.

A second procedure, said to produce even a better product is to dissolve 100 parts of casein in from 10 to 20 parts of

ammonium hydroxide and 300 to 400 parts of water. To the solution from 300 to 500 parts of latex are added, and the mixture precipitated with from 4 to 15 parts of slightly diluted sulfuric acid.

Another alternative, and one that has considerable promise for commercial production, depends upon the direct use of skimmed milk, in which case it it not even necessary to add an alkali to dissolve the casein. In this case, about 500 parts of skimmed milk are simply mixed with the rubber latex and an acid added to precipitate the casein.

The inventor further says that by mixing the new material with various fillers, coating materials, molded articles and the like can be made from his composition of casein and rubber.

A Phenol-Acrolein Resin

Charles Moureu and Charles Dufraisse, of Paris, have obtained patent protection upon resins made from phenol and acrolein. The patent (U. S. P. 1,607,293) was filed in 1922, with priority in France of March 31, 1919; and patents have issued to the inventors in France, Belgium, Italy, England and Germany, during 1919 and 1920.

The resins, which are said to be so hard that they can not be scratched with the fingernail, and which are suitable for molding, impregnating etc., are made by treating 10 parts of commercial phenol and 90 parts of anhydrous acrolein with 1 part of caustic soda.

A reaction takes place spontaneously at ordinary temperatures but can be accelerated by heating, not above 100° C. The reaction is complete, with 100% yield when the mass has reached the desired consistency.

The proportions of acrolein and phenol can vary within very wide limits, e. g. from 90% as in the above example acrolein to 20% acrolein and even less.

Instead of using acrolein its-

(*Continued on page 348*)

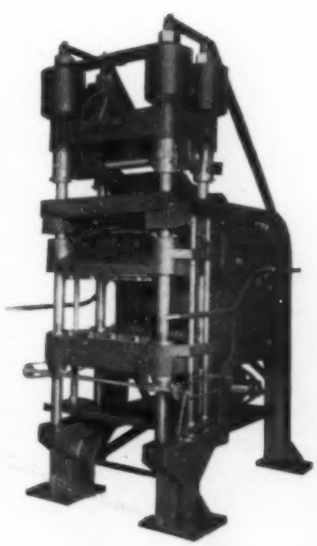
Terkelsen Mechanical Presses

Number Three of a Series

"low operating cost"

A small electric motor furnishes the source of power for each Terkelsen press: 2 h. p. is sufficient for the type illustrated here. It is used simply to start the press and may then be shut off or allowed to idle at a minimum of expense. The powerful mechanical movement, closing the press, stores energy in large heavy springs which automatically maintain the pressure and follow up the contraction of the material.

With Terkelsen presses, maintenance and upkeep costs are almost nothing. These machines are built substantially, and there is very little wear with no repacking or leakage to provide for. The only upkeep cost is for lubrication.



Type A-1 Model 100

Capacity	100 tons
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Stroke	12"
Maximum Adjustment of Lower Die Block	10"
Motor	2 H. P.
Approximate Weight	8000 lbs.

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EDITORIAL · IMPRESSIONS

A "Plastic Age" in Fact

SOME years ago, when the first of the phenol resin molding compositions, *Bakelite*, appeared on the market, its only competitor was hard rubber. It was mainly with the view of replacing hard rubber or *Vulcanite* that the early experiments with the resin molding powders were made.

The growth of this business has been phenomenal, and to the uninitiated, well nigh unbelievable. One would have thought that the manufacturers of the older product, hard rubber, would have been sorely pressed by the new materials, but this proved not to be the case. As in almost every instance where a new material was offered to the world, its uses soon became so numerous that the novel effects obtainable led to its introduction into fields where its predecessor had never ventured thus providing an outlet for the ever-increasing production.

Room For All

Modern industry is so complex, and the needs of commerce and manufacture so diversified, that it is safe to say that any plastic material which may be introduced, and which differs sufficiently from what is already known, or which gives promise of fulfilling some particularly stringent requirement, will, if properly financed and intelligently handled, make a name for itself.

Competition, at least for the present, lies rather in the race to offer new things to the public than in cutting down on the price of the old. Even the producers of the most stable line of plastic materials, as the manufacturers of the pyroxylin materials, are continually offering new and startling effects to their consumers.

One would have thought that the field of pyroxylin plastics had just about been sold to the saturation point, but along came the vogue for fancy fountain pens and the business in this one line alone reaches into the millions.

The lowered cost possible by the use of pyroxylin tubing, for example, made it possible for one concern to sell cheaply and advertise nationally a pen with a transparent barrel, provided with a novel type of filler which enables the user to know at all times if he has ink in his pen. Besides this, the amount of ink held by this particular self-filling pen is at least three times that any fountain pen using the ordinary rubber bag. Apparently it had been believed that the ink would adversely affect pyroxylin tubing, but these pens stand up exceptionally well, despite the fact that the ink is in direct contact with the interior of the plastic tubing.

This is merely one example among thousands.

A mere casual perusal of what is waiting for the readers of *Plastics and Molded Products* shows that the items of interest run all the way from plastics from the shells of lobsters to entirely synthetic amber from organic chemicals such as styrol; and from the making of molded bearings for machinery to the brake linings on automobiles.

Is it a Plastic Age? We'll tell the world it is. And that is our particular mission and pleasure.

"Zyl" Spectacle Frames Rule Supreme

The following taken from NATIONAL INDUSTRY

NEWS SERVICE so accurately echoes our own impressions on the well night universal use of the pyroxylin plastic "shell" frames that we feel certain that our readers will find it interesting, especially in view of the number of new processes for production of this commodity that are being reviewed in almost every issue of PLASTICS.

AMERICAN inventive genius continues to do startling things for and to the world. In a few years it has discarded most of the rimless and metal rim frames for spectacles and eye glasses and replaced them with what slang has termed "horn rims." Properly speaking the substance of the rims is "shell." and it takes more than 500,000 pounds of nitro cotton to supply the annual demand for shell rim spectacles.

When President Coolidge's voice is resounding through your radio you may know that he is standing erect before the microphone looking through the heaviest kind of shell rim spectacles as he reads his carefully prepared manuscript. And when he finally has the opportunity to carry on the long promised trans-Atlantic telephone conversation with the King of England the latter, too, will be wearing his accustomed shell rim spectacles. The rulers of these two great countries wear the same kind of frame work across their noble brows. In the acceptance of this style they are the followers and not the leaders.

To test out this belief that the whole of the United States has been converted to shell rims a New England manufacturer of optical goods recently counted the customers in a big department store in Boston, with the result that he found 1,019 persons in the store wearing spectacles and eye glasses of different kinds, but 785 were the pyroxylin plastic rimmed frames—more than two out of every three. Carrying the investigation to the Harvard Campus the manufacturer found that only 197 persons wore the metal and rimless eye glasses and spectacles as against 1,000 wearing shell rims.

Then the manufacturer went

back to his office to study his books and records. He found that in 1918 he was supplying 500,000 customers, and that owing to the breakage of rimless and metal rim glasses that his "repeat business" was eight per cent. Turning over the pages he ascertained that in 1925 his list of customers had grown to 750,000 and that the "repeat business" had dwindled to two per cent. During the two periods the "shell" had swept the country. The manufacturer recalled the many times that opticians and eye glass specialists had complained to him that "the repair business is ruined." The same manufacturer had attended conferences and meetings at which the controversy had waxed warm between "service and never mind the breakage" with the sturdy shell rims, versus poorly protected lenses and plenty of breakage with bigger profits.

Particular Advantages

Eye specialists have ascertained that the rays of light on the edge of rimless spectacles reflect in such a way as to reach the eye and to interfere to some extent with the rays coming from the surface of the glass. This is especially pronounced in the bright sunlight. The same thing is true of metal rim glasses where the reflection of light on the metal interferes with the direct rays coming from the glass itself. The use of shell rims prevents this.

Evidently the great uncharted world of public opinon has resolved itself in favor of the shell rims on account of their style and the practical comfort that they afford. The manufacturer whose views have been related above tells us in an interview on the subject that women, girls, and men "have found that the alert snappy appearance which shell rim glasses make, add considerably to the sense of well-being which every normal man and woman should naturally possess." The American public—as Herbert Hoover would express it, has "standardized" shell rims."

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TECHNICAL ABSTRACTS
AND PATENT REVIEW

Molded Indurated Fiber Article (goggle frames). H. H. Clark, U. S. P. 1,595,856; Aug. 10, 1926.

Relates to the manufacture of articles from indurated (i. e. so-called vulcanized) fiber, and especially to making goggle frames. The invention resides essentially in means of assembling the fabric or paper so as to get a "grain" that will permit of sharp bending of the indurated fiber without breaking. Tubular articles, non-uniform in diameter, are formed by winding a sheet of the material upon a mandrel, etc.

Coating Metal Plates (and dies) for Molding. F. L. Minnear, assignor to Westinghouse Electric and Manufacturing Co., U. S. P. 1,612,391; Dec. 28, 1926.

Relates to the prevention of the tarnishing of the dies, or specifically, the metal plates used in molding and shaping "Micarta" board in hydraulic presses. As a pressure as high as 1000 lbs. per sq. inch, and temperatures from 150 to 180°C are used, the ordinary linseed oil or linseed oil and machine oil mixtures used to lubricate the molds and plates to prevent adhesion of the "micarta" board become carbonized and hence discolor the metal plates and dies.

The inventor has found that by adding an oxidizing agent such as red-lead to the oil used for lubricating the dies, that this carbonization will be prevented, the preferred composition comprising 8 parts of boiled linseed oil and 4 parts of red-lead (Pb_3O_4). The action is ascribed to oxidation of the carbon by the oxygen of the red-lead.

Sealing, molding and insulating composition comprising sulfur and cumarone resins. Harry L. Grant and William R. Farren, assignors to the Atlas Powder Co., U. S. P. 1,612,576; Dec. 28, 1926.

Sulfur as a plastic substance, especially for low-pressure molding or casting is quite old, but the main difficulty with this cheap and waterproof substance is that it is rather brittle, and that castings made from it are prone to be crystalline. Inventors have discovered that the addition of cumarone resins to the sulfur prevent this. Finely divided filling materials are also added to not only lower the cost but to increase the strength of the cast objects. Molding is carried out under practically atmospheric pressure and the mixture is primarily intended as a sealing-compound for electric fuse-heads in blasting shells.

A further use of the material is in molding by what is generally spoken of as the "chill molding" method, which consists in charging the material into a heated mold and then chilling the same to set the material, analogous to the methods employed with shellac in making gramophone records.

Cellulose ester or Viscose Sponges. Ludwig Mostny, U. S. P. 1,611,056; Dec. 14, 1926.

Sponge-like structures are made from cellulose esters, and specifically from viscose by mixing, for example, 160 grams of a 20% viscose solution (cellulose xanthogenate) with 16 grams of cotton, hemp or flax fiber, and 1.2 kilograms of either sodium sulfate or other similar readily melted or dissolved substance, this mixture being shaped into the form desired. The material is thereupon treated with steam at a pressure of from ½ to 10 atmospheres for from 15 minutes to 4 hours. A spongy mass results, which is washed with water to remove the sodium sulfate or whatever salt has been added, leaving an artificial sponge. If cellulose nitrate is used instead of viscose, the same must be treated with ammonium sulfide to de-nitrate the product to reduce its inflammability.

Plastic Material Suitable for Molding Battery Boxes. Edward F. German, U. S. P. 1,610,765; Dec. 14, 1926.

A non-conducting, tough, elastic and resistant plastic material for molding battery boxes in one piece in hydraulic presses is made by mixing 35% of an elastic mineral resin, 12% gilsonite, 6% asbestos fiber, 35% diatomaceous earth, and 12% of clay. The homogenized mixture is molded hot.

Dyeing Bone. Elmer C. Bertolet, assignor to George K. Hale Manufacturing Co., U. S. P. 1,594,490; Aug. 3, 1926.

Many commercial articles, such as buttons, knife-handles, game-counters and toys are made of natural bone and it is the object of this invention to dye this material uniformly and permanently.

This is brought about by dissolving an oil-soluble, fat-soluble or spirit soluble organic dyestuff in melted fat, oil or fatty acid, and then to dilute this while hot with an organic solvent such as petroleum distillate, naphtha, kerosene, paraffine oil, benzene or homolog thereof, phenol or an organic ester as ethyl, methyl acetate, or alcohols or carbon tetrachloride, etc. The bone pieces are heated from 170 to 230°F in this non-aqueous dye solution. Cresylic acid is used to get a level shade of color. The claims actually cover, for example "A bone material or product completely penetrated throughout with coloring material", which, to say the least, is broad protection.

Thermoplastic material for molding composite dry-battery electrodes. Raymond C. Benner and Harry H. Thompson, assignors to National Carbon Co., U. S. P. 1,594,810; Aug. 3, 1926.

The invention concerns a thermoplastic material suitable for molding composite dry-battery electrodes of a type where a metal plate, for example zinc, is coated on one side with a coating that although impermeable to the electrolye is nevertheless conducting to the current, and permits the construction of the now well-known type of flat-cell radio "B" batteries. The composition in its preferred form consists of 30-40 parts of rosin, 5-7 parts linseed oil, 8-10 parts "scale-wax", 150 parts 130-mesh graphite and 35 parts 100-mesh graphite. Engine oil can replace the linseed oil, and a synthetic resin, as cumarone resin, can replace the rosin. A small amount of lime may also be added.

Electrical Insulating panel of cellulose and resins, coated with an acaroid resin. Daniel M. Sutherland, Jr., U. S. P. 1,597,168; Aug. 24, 1926.

A former patent of the inventor, U. S. P. 1,554,895, describes a method of forming an insulating board or panel from cellulose pulp and binders as gilsonite, asphaltum, mineral pitch, elaterite or resins, hardened by heat and pressure. Formerly the boards were finished by a surface coating comprising cellulose acetate. The present invention employs gum acaroid varnish, i. e. 2 lbs. gum acaroid dissolved in 1 gallon of alcohol, as a surface coating, after which the panelboard is given the final molding in an hydraulic press. Plasticizers such as paratoluenesulphonamide, tri-phenyl phosphate, triacetin, etc., may be added.

Gum acaroid is also known, according to the inventor, as: gum accroides, red acaroid resin, Yacca gum, Grass tree gum, and by its proper botanical names as *Xanthorrhoea australis, xanthorrhoea quadrangularis, xanthorrhoea drummondii* and *xanthorrhoea preisii.* There is also another grade of acaroid resins known as *xanthorrhoea hastilis*, commonly called Botany Bay gum and Black-boy gum. Any one of these will do for the purpose.

Apparatus for filling molds with plastic material. Arthur R. Kearney and Charles W. Taylor, U. S. P. 1,597,803; Aug. 31, 1926.

While primarily intended for filling molds of hydraulic or vulcanizing presses with rubber, the machine is also suitable for charging plastic stock of other composition. The machine feeds heated plastic stock directly into the dies, from what is

termed a "mold ram". Details are only intelligible in connection with all the four sheets of drawing accompanying the specification.

Condensation products from mono- and dicyclic phenols and aldehydes. August Amann and Ewald Fonrobert, assignors to Chemische Fabriken Dr. Kurt Albert G. m. b. H. Germany. U. S. P. 1,614,171; and 1,614,172; Jan. 11, 1927.

Intermediate condensation products suitable for the production of phenol resins of definite properties are made by treating a phenol, such as phenol, cresol, naphthol or analogous substance with just enough 10% sodium hydroxide solution to dissolve it, and then adding this solution gradually to an aldehyde such as formaldehyde, acetaldehyde, etc. The reaction takes place in the cold, and in some cases artificial cooling is resorted to. The products separate out in crystalline form and are the corresponding phenol-alcohols.

The products are intended for the the final preparation of synthetic resins. This firm is the maker of the Albertols, which were described in Plastics, Aug. 1926. (p. 267.)

The second patent describes the method for preparing the final condensation products. The intermediates prepared as described in the first patent are dissolved in alkalies and treated with further quantities of aldehydes, whereupon thin fusible resins result, which, however, are capable of being hardened under heat and pressure. The claims comprise a "resinous liquid adapted to be converted into an infusible mass by the action of heat, being a reaction product of a dihydroxy diaryl dialkyl methane treated in an alkaline medium with an aliphatic aldehyde at a temperature not substantially above 60°C."

Foldable Comb. Charles Strauss, U. S. P. 1,616,930; Feb. 8, 1927.

A comb which may be opened or folded, and rigidly maintained in the unfolded or operative position by means of a slide. Even open the comb is perfectly flat-sided. The two halves fold back one against the other.

Laminated molded material. William C. Geer, assignor to B. F. Goodrich Co., U. S. P. 1,617,707; Feb. 15, 1927.

This patent covers the production of laminated sheets, such as are used for B-battery cases, etc., from the "heat-plastic" rubber isomers described in an earlier application of the patentee, and which isomers are made by acting on rubber with para-phenol-sulfonic acid or para-toluene-sulfonyl chloride. Organic fluxing agents are added, and the following is a typical formula: "heat-plastic" 86 parts, aldol alpha-naphthylamine 3 parts, benzidine 1 part, tung oil 10 parts. Laminae of heat-curable regular rubber are superimposed on sheets of the "heat-plastic" and vulcanized together.

Molding Composition. R. Espino, U. S. P. 1,609,539; Dec. 7, 1926.

Consists of: Plaster of Paris 16 oz., white flour 6 oz., glue 2½ oz., paper 4 oz. and water and coloring matter to suit.

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3. The ejection stroke of the bottom dies is equal to the stroke of the main ram. This long stroke makes it possible to mold deep pieces and eject them without sacrificing any of the press opening.

4. The elimination of top ejector tension rods passing through the top head and bottom platen increases the space available for dies.

5. The bolsters, top head, moving platen and holding down gibs are slotted to allow for varying widths of molds.

The above features tend to increase production and reduce initial mold costs.

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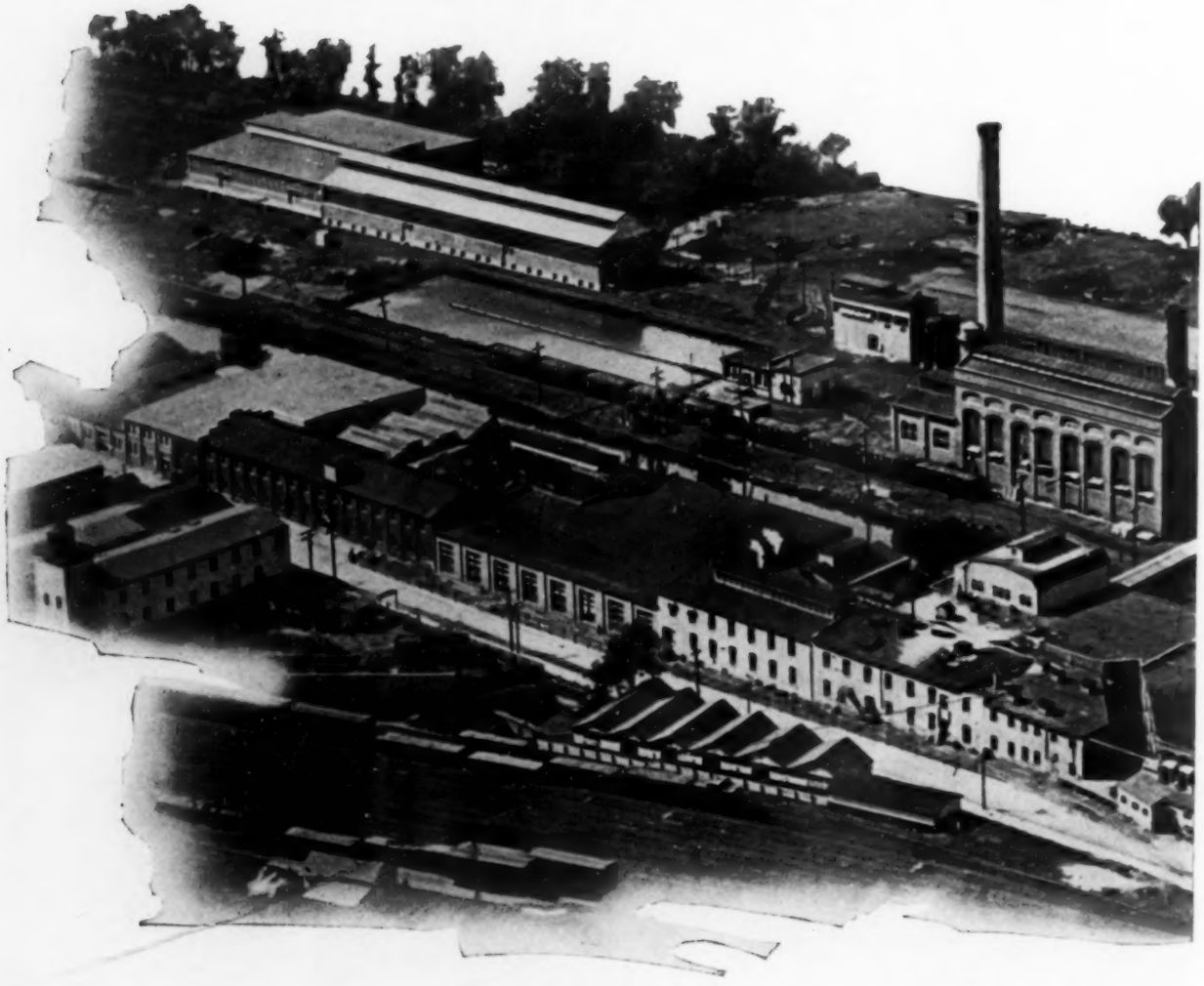

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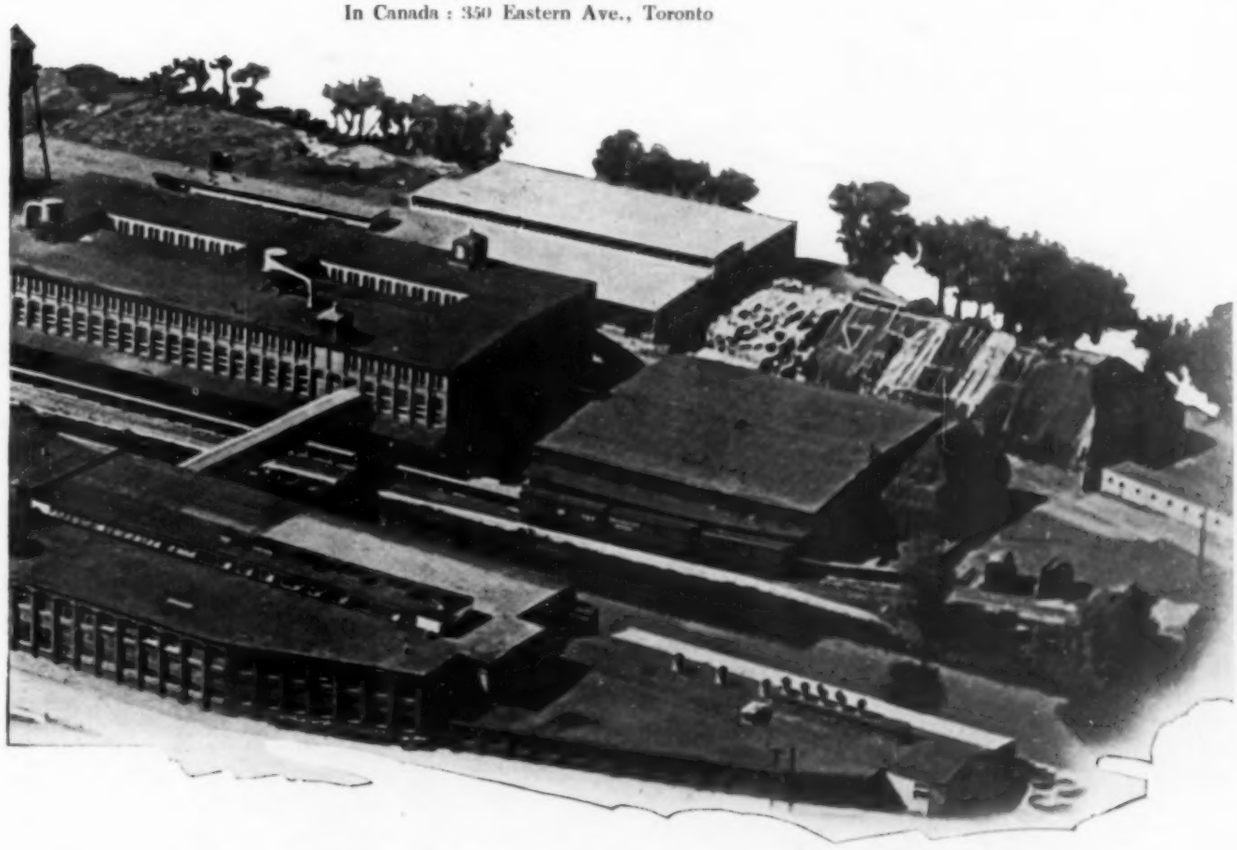

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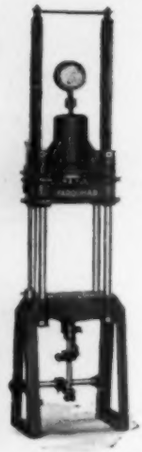

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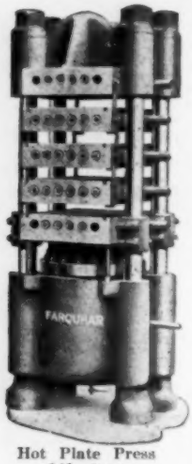

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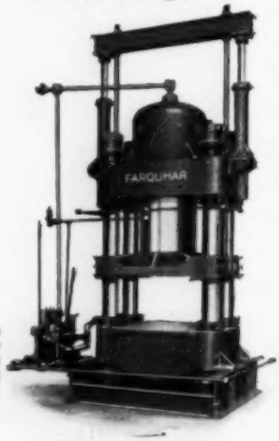

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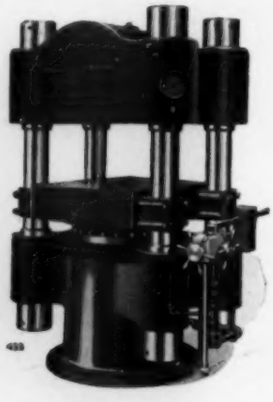

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Pearl Effects

(*Continued from page 324*)

sprayed, brushed or dipped on the objects which are to be given the pearly luster. Quite a number of these solutions are now commercially available.

The recent methods for making imitation pearl pyroxylin plastics are described, mostly in connection with what is evidently the Higgins' process, although his name is not mentioned. The work of Jean Paisseau, who has patented a number of processes is also mentioned, as he uses not only the fish scales, but also the swimming-bladders and skins of the fishes, removing the crystalloid particles from the organic matter by means of chemicals.

Paisseau Process

One of the most recent of Paisseau's methods, however, makes use of a purely synthetic material for the production of pearl essences. For example, a solution of 1 part of barium chloride in 5 parts of water is poured into a solution of 5 parts of sodium thiosulfate in 5 parts of water, an additional 200 parts of water being then added and the mixture boiled. After cooling, the clear liquid which stands above the precipitate which has formed by the action of the thiosulfate on the barium chloride, is poured off, and the precipitate is washed with alcohol in gradually increasing concentration, so that finally all the water is removed from the precipitate. The small crystals thus obtained are then covered with a solvent such as alcohol, acetone or the like, and then incorporated within a plastic material such as glue, gelatin, casein, cellulose nitrate, cellulose acetate, viscose, artificial resins or even rubber.

Maurice de Kekhel has also written a number of instructive articles upon the removal of natural mother of pearl from shells. (*See Kunststoffe 1925, 15, 216; Revue des Matieres Plastiques, 1925, 1, 15; and Plastics, 1926, 2, 93*).

In closing, the author again refers to some of the work of

Paisseau, who has demonstrated that the substance in the pearl essence upon which the iridescence depends, is very stable and will withstand treatment with quite active chemicals for its purification, without losing any of its luster. Even such powerful reagents as permanganates, hypochlorites, sulfurous acid and the like, remain without effect upon the material abstracted from fish-scales.

Present day development is very active, and new processes are being constantly worked out, so that the early commercial solution of this age-old problem appears to be at hand.

Prystal

(*Continued from page 324*)

resembling the latter in beauty with the evident advantages of being less difficult to drill and easier to polish. For an equal volume it weighs about half as much as hyalin quartz, quite an appreciable difference for necklaces and ornaments.

Optical Properties

Its refractive index for the D ray, at 150° is 1.5548, while that of the quartz is 1.5442, slightly in favor of Prystal.

At present it is not suitable for accurate lenses, as it shows a double refraction deleterious to purity of image, but attempts are being made in the laboratory to diminish or suppress this drawback and to obtain a perfectly constant refractive index.

Below are the refractive indices measured by M. Vaurebourg, head of the optical laboratory of the Ecole de Physique et de Chimie, on a sample 2 months old, density 1.32:

Red hydrogen ray = Nc 1.5506
Yellow sodium ray = Na 1.5548
Blue hydrogen ray = Nf 1.5563

Not only does Prystal have interesting dispersive power, analogous to that of a light flint glass, but the dispersion varies quite anomolously as compared with the usual optical glasses.

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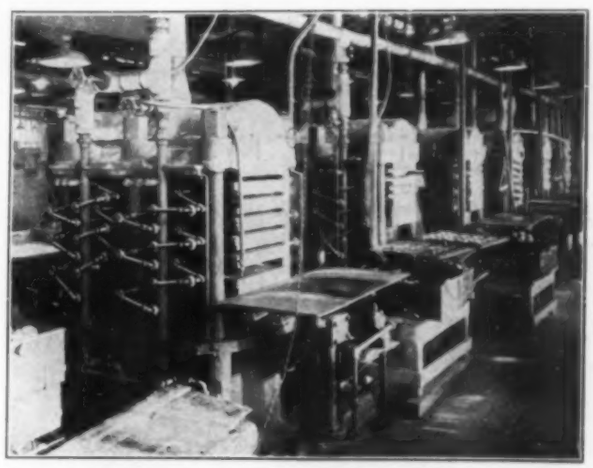

Portion of pressroom showing vulcanizing presses used for making Goodyear Wingfoot heels. All are completely equipped with FLEXO JOINTS.—Courtesy Goodyear Tire & Rubber Co., Akron, Ohio.

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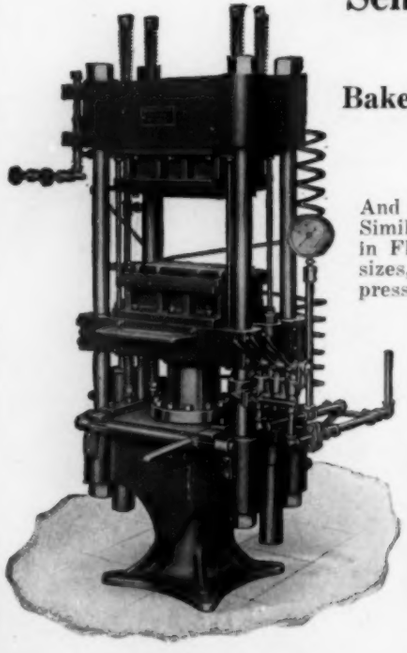

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Prystal and Pollopas Compared

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I keenly regret that I cannot give more technical information on this material, foreseen by Goldschmidt in 1887 and first prepared by the two German chemists, Einhorn & Hamburger in 1907. The starting point was dimethylal urea, itself prepared from urea and formaldehyde.

Molded Gears

(*Continued from page 328*)

of a modified hub structure.

Referring to Figs. 1 and 2, the apparatus comprises a table 1, provided with a shaft 2, journaled in a suitable bearing bracket 3. A mold, comprising a matrix 4, a base plate 5, having a threaded opening 6 therein, which is adapted to receive a bolt 7, extending through a clamping plate 8 for securing a metalic hub member 9 thereto is mounted on the base 1. The hub 9 is provided with a roughened outer periphery 10, having a multiplicity of small recesses formed by knurling.

A corrugating die comprises a pair of fluted co-operating wheels 12 and 13 that are secured to the motor shaft 14 and the stud shaft 15, respectively, in alinement with the opening 16 in the mold. A pair of gear wheels 17 and 18, mounted respectively on the motor shaft 14 and the shaft 19, connect the dies 12 and 13 to the work table 1, through the bevel gears 20. The shaft 14 may be actuated through a belt drive, or a motor 21 may be connected thereto,

which actuates the dies and work table simultaneously.

The gearing may be of such proportion and so arranged as to obtain any desired speed of rotation of the table 1 relative to the peripheral speed of the dies 12 and 13, so that the speed of rotation of the mold on the table 1 corresponds to the rate of feeding effected by the dies.

A strip of fibrous material 22, such as fabric, which has been previously impregnated with a binding agent, is fed from a supply roll (not shown) into the dies 12 and 13, which corrugates it in the manner shown in Fig. 4, and feeds it directly into the mold, which rotates, thereby forming a continuous helix of superposed layers 23 (Fig. 1) until a sufficient number of such layers have been built up around the hub member 9. Once the number of layers has been determined, a revolution counter may be connected to the shaft 2 or the corrugating dies to indicate the number of layers deposited in the mold. The strip is cut either above or below the corrugating dies and the mold removed from the work table 1. A pressure ring is inserted on top of the assembled layers and pressure in a suitable hydraulic press to compact and consolidate the material, forming an integral mass which adheres to the hub member 9 by being forced into the recesses 10 in its outer periphery.

Only 8% Waste

The difference of the outer and inner diameters of the opening 16 in the mold will vary the density of the composite ring member 24 (Fig. 6) unless provision is made to allow for this difference in the molding operation. This can be accomplished by employing a pair of pressure rings 25 having a tapered surface 26 (Fig. 5) to mold the ring 24 in a substantially dovetail shape, and the tapered surfaces of the finished gear may be machined flush with face 27 of the hub 9, as shown in Fig. 6. The difference in the amount of the material between the outer and inner peripheries of the ring is approximately 8%, which

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is wasted in machining, as compared with the 35% waste in the prior punching operations.

The excess material at the outer periphery of the hub 9 may be taken care of by recessing the outer periphery of the hub, as shown in Fig. 7, either in the form of a V groove 28, or a concave radius, the groove corresponding, in volume, to the amount of material displaced when employing the straight pressure rings instead of the tapered ring members 25.

It is evident, from the above description of Jaspert's invention, that gear wheels manufactured in accordance with this process are inexpensive, economical and adapted to be made by an automatic process in production quantities without sacrificing any of the qualities essential to the finished gear wheel.

Chitin Plastics

(*Continued from page 328*)

tions under ordinary pressure,—that $CaCl^2$ solutions while converting casein into the ropy-plastic state, at the same time fails to produce collodial dissolution of casein (or dissolves it very little); however, $Ca(CNS)^2$ CaI^2, and $CaBr^2$ solutions produce a marked colloidal dissolution of casein.

Casein is most easily dispergated in LiCNS-solutions; even in cold LiCNS solutions casein may go spontaneously into the colloidal solution and for instance, easily at 25°C.

The dispergation of fibrin and keratin in salt solutions is carried out with more difficulty than the dispergation of cellulose or of chitin, for example.

However, extremely soluble salts (e. g. LiCNS and $Ca(CNS)^2$) in strongly concentrated solutions dispergate these substances to a marked degree.

For instance, keratin (under the form of pure white woolen yarn) in extremely concentrated LiCNS-solutions (between e. g. 170°-200°C) after swelling, rapidly assumes a translucent, pellied plastic state, and on fur-

further heating, passes over into the colloidal solution.

It is noteworthy, that the rate of the dispergation process (colloidal dissolution) of all the above substances (cellulose, fibroin, chitin, casein, fibrin, keratin) is dependent not only on the nature of a certain given salt, and the concentration and temperature of its solution, but also to a considerable extent, upon the "history of life", "the age", the other "antecedents", and upon the degree of purity of the preparations taken for experimentation.

Conclusion

Therefore, it would be possible to dissolve colloidally either cellulose together with fibroin, or cellulose, chitin and fibroin simultaneously in aqueous solution of some extremely soluble salt, such as NaI, LiBr, $Li(CNS)_2$, $Ca(CNS)_2$ solutions.

And from these colloidal solutions complex plastic masses may be obtained as, for instance, x-cellulose + y-fibroin; x-cellulose + y-chitin + z-fibroin, etc...

Hence it is my firm conviction that the scientific and technical study of the properties of such complex plastic masses and their product-filaments is of great interest, not only from the dispersoidological aspects, but because it opens a wide horizon for the artificial filaments industry.

The following references appertain to the small numbers in the text and give the titles of articles which contain further information on this subject.

(*) The application for the Patent on this method is made in the Japanese Empire.—Patentee: *The Imperial Industrial Research Institute of Osaka;* Inventor: *Professor P. P. de Weimarn.* Date of invention: *December,* 1925. The application for the Patent was the cause of my delaying for several months the publication of the results obtained by me.

(2). P. P. de Weimarn, *Journal of the Russian Chemical Society,* 44, 772 (1912). *Kolloid-Zeitschrift,* 11, 41 (1912). The English translation of this paper appeared in the *Reports of the Imperial Industrial Research Institute of Osaka,* vol. IV, N° 7, 17-21 (1923).

Southwark Hydro-pneumatic Moulding and Curing Press

No Pumps or Accumulators

are required to operate
This Southwark Standard
HYDRAULIC PRESS

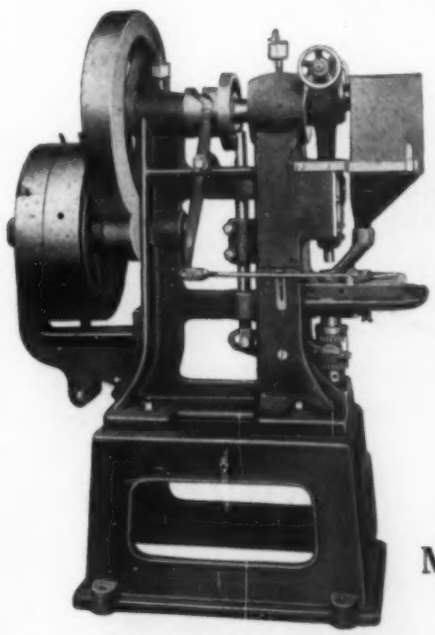
Operates on Air or Steam Pressure—Requires little space—Simple in operation. Ideal for small shops, laboratories, etc.

The Hydraulic Press illustrated above is designed to operate on Air or Steam Pressure. This eliminates the usual pump and accumulator equipment and makes an efficient and inexpensive installation. Let us tell you about it.

SOUTHWARK
Foundry and Machine Co.
402 WASHINGTON AVENUE
PHILADELPHIA, PA.
AKRON, O. CHICAGO, ILL.

FJS **DON'T WEIGH** FJS

Preform Your Bakelite



Stokes Preforming Press

STOKES
Preforming Presses
make
40 to 60
preforms per minute

Weights accurate and easily adjusted

Odd shapes and perforated pieces easily produced

We also manufacture a **Measuring Machine** which weighs without preforming

F. J. STOKES MACHINE CO.
5834 Tabor Road,
Olney P. O.
Philadelphia

EXPERIENCE

To Cope With Your
Pyroxylin Plastic Problems

Graduate chemical engineers with fifteen years of practical working knowledge await your call

E. W. WIGGINS

LEOMINSTER, MASS.

New England Representative for

NIXON NITRATION WORKS
and
JOS. H. MEYER BROS.

NACROLAQUE NIXONOID PEARL ESSENCE
in
Sheets Rods Tubes

Pyroxylin Plastic Cellulose Acetate and Other Non-Inflammable Materials

"PAISPEARL"

wherever used always means

MORE BUSINESS

Use pearl sheeting made with "PAISPEARL"—it does not discolor, or become brittle in working, and is not poisonous or harmful in any way or use.

Coat your products with the lustrous "PAISPEARL" finish and increase your sales.

Paste and solutions for spraying or dipping giving a lustre beyond compare.

Samples coated free. Further information on request.

PAISPEARL PRODUCTS, *Inc.*

65 NASSAU STREET NEW YORK CITY

LABORATORIES—Eastport, Me.
Yonkers, N. Y.

(3) On the character of these several series of inequalities see P. P. de Weimarn, *Journal of Chemical Education* 3, 317-379 (1926).

(4) P. P. de Weimarn, *Annals of the S.-Petersburg Mining Institute*, 4, 151 (1913) A German translation appeared *in Kolloid-Zeitschrift*, 29, 198 (1921), and a translation into English was published in the *Reports of the Imperial Industrial Research Institute of Osaka*, vol. IV, N° 7, 22 (1923).

(5) In the Laboratory of Physical Chemistry (Director Professor Y. Osaka) of the Imperial University of Kioto, Dr. S. Itzino is now submitting to a special study the hydrolitic action (compare P. P. de Weimarn *Annals of the S.-Petersburg Mining Institute*, 4,151, 1913) of concentrated aqueous solutions of neutral salts upon the substances mentioned above.

Acrolein Resin

(*Continued from page 335*)

self as raw material, a suitable resin or polymerization product thereof may be employed. In this case it is necessary to warm the mixture in order to prepare the condensation products with phenol.

On the other hand however it is also possible to dissolve the acrolein resins and the phenol in a suitable solvent which is then allowed to evaporate, or the two substances are melted together at a temperature near 100° C. It is also possible to employ a solution of acrolein resins in acrolein itself.

Obviously phenol itself can be replaced by any other suitable body containing a phenolic group, e. g. simple phenols such as cresol, or naphthols, or polyhydroxy bodies such as guaiacol or eugenol.

Casein Plastics

(*Continued from page 330*)

the manufacturer to cut sheets to order from blocks which are kept in stock, and thus makes the furnishing of special orders or odd dimensions possible, whereas with the other systems plates varying from millimeter to millimeter only could be offered to the trade. It is obvious that the pressing methods are not capable of furnishing sheets of so many different dimensions as can be secured by the cutting process.

With this final step the production of casein solids from rennet casein, as far as the mechanical equipment and operations are concerned, is about completed. The chemical treatment of the casein solids sheets and rods will be taken up in the later chapters of this series of process.

Before entering upon the indurating and drying of the casein solids sheets, certain other types of machinery, especially such as can be advantageously employed for the working up of seconds and other factory products by the manufacturer of the raw material, rather than by the fabricator will be discussed in the August issue of PLASTICS.

Insulation

(*Continued from page 328*)

orotherwise formed and treated.

The lecturer illustrated his remarks by numerous samples of the work done by various German molding concerns, such as sockets, switch-casings, multiple switch bases with sixteen inserts, volt-meter parts, molded parts as thin as 1 mm. and even molded fire extinguishers in which the required slots and openings had all been formed at one molding operation.

Insulating material of type 1-a, consisting of phenol resins and wood flour, is not considered as fireproof, but can be protected from the sparks of an electric arc by an overlay of asbestos.

(*This article will be continued in the August issue of* PLASTICS, *where the particular problems of certain types of parts will be taken up.*)

More Japanese Pyroxylin

ACCORDING to our Consul at Yokohama, during 1926 there was a considerable increase in the American imports of pyroxylin plastics from Japan.

Statistics are as follows:

	Pounds	Value
1925	589,499	$628,530
1926	761,795	780,336

J. J. KREHBIEL

381 Fourth Avenue New York

Machinery
for Manufacturing Buttons,
Combs, Fountain Pens, and
Other Articles from
Casein and Composition Products
Brush Making Machinery

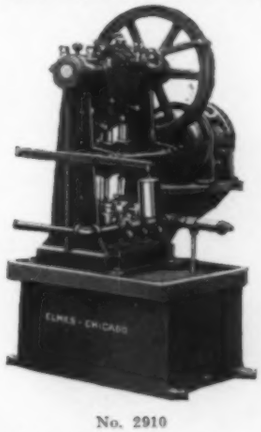
Sole Agent for SYLBE & PONDORF

Hydraulic Plastic Moulding Equipment

A Complete Line for the Manufacture of Insulating Parts

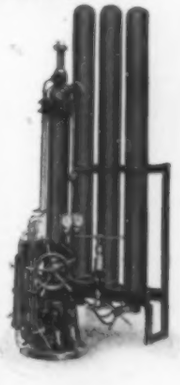
No. 2693

The only design of press where the knockouts are returned without moving the press ram, or manipulating the valves. This patent feature permits re-seating knockouts and die buttons without loss of time, and a maximum clearance for cleaning and refilling dies, giving 10% to 20% greater output.



No. 2910

High and Low Pressure Pump with manually controlled Low Pressure Discharge.
This pump when direct connected to a press reduces the flow through the release valve when it is desired to exhaust the press, thus permitting a quicker return of the press ram.



No. 3000

Compressed Air Accumulator.
No Shocks.
No Foundation.
No Heavy Ballast.
Less Head Room.
Less Floor Space.
No Guide Springs,
or Bumper Blocks.
Locate where most Convenient.

Chas. F. Elmes Engineering Works, 1002 Fulton St., Chicago, U. S. A.

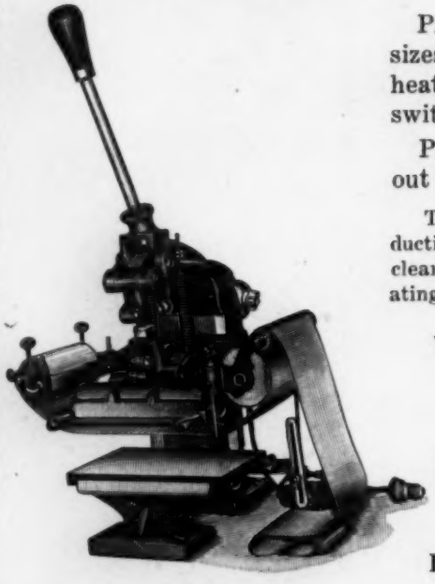
NEW YORK—Room 312, 30 Church St., Phone Cortland 4435
NEW YORK EXPORT OFFICE—420 Lexington Ave., Phone Lexington 4270

HYDRAULIC ELMES PRESSES PUMPS ACCUMULATORS SINCE 1851

Our Gold Inlaying Press

WITH AUTOMATIC ROLL FEED

is just what you have been looking for. Will take Roll Leaf any width to 5". Positive feed from ¼" to 5½". Set ups and adjustments quickly made.



Press is made in three sizes furnished complete with heating units and 3-way switch control.

Presses sold with or without roll feed.

This Press will speed up production. The stroke gives ample clearance to feed in work eliminating the draw plate operation.

Write for full particulars.

Standard Tool Company

75 Water Street

LEOMINSTER, MASS.

It's H-P-M for the HIGH PRESSURE jobs

In the PLASTICS INDUSTRY this includes Hydraulic Presses for—

Curing and molding all plastic materials in either hand molds or fixed dies. Sizes and types to economically fit all production requirements. Die Sinking and Hobbing.

Also Automatic Controls for timing any molding cycle; Hydraulic Pumps, Accumulators, Valves and Fittings.

THE HYDRAULIC PRESS MFG. CO.

Engineer ~ ~ Builders of

HIGH PRESSURE HYDRAULIC MACHINERY

TWENTY EAST BROAD, COLUMBUS, OHIO

PLANT—MOUNT GILEAD, OHIO.

"Rubberset" No Trademark

THE Rubber and Celluloid Co.'s opposition, as owners of the "Rubberset" trademark, to the registration of "Rub-R-Tite" by the Star Brush Manufacturing Co., was dismissed by the decision of the Commissioner of Patents.

It appeared from the record that the opposing concern's predecessors, owners of the original patent covering the setting of brush bristles in rubber, adopted the notation "Rubberset" as its trademark nearly 20 years before the applicant used the mark they now seek to register. It was held to be clear that the term "Rubberset" like "glue set" and "cement set" as applied to brushes, was merely descriptive, and that even if the notation "Rubberset" were sustained as a suggestive trademark, any rights would not preclude the word "rubber" in connection with brushes.

Some Recent Trade-Marks

Serial No. 244,469. Postal Pen Co., Inc., New York, N. Y.

The mark consists merely in an amber colored fountain pen body, with black end portions. Use is claimed since July 1, 1925.

Serial No. 240,948. Bakelite Corporation, N. Y.

Bakelite. The uses cover an entire page in the Official Gazette of the U. S. Patent Office, listing molding compounds and mixtures, etc., for making electrical commodities. Claim use for some of the articles as far back as 1909.

Serial No. 237,487. The Tefra Co., Wilmington, Del.

Tefra. Tooth brushes, toothbrush heads and handles. Claim use since Aug. 20, 1926.

MR. SWANSON, formerly of International Insulating Co., is now superintendent in charge of the molding plant for Reynolds Spring Company at Jackson, Mich.

TASSI BROS. MIRRORS NEW YORK AND PARIS

Mirrors of the Better Kind for Fabricators of Celluloid Toiletware

We Specialize in French Mirror Plates

Tassi Bros.

525-531 W. 24th St.

New York City

FOR SALE

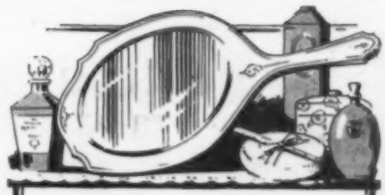
Several Liebig No. 2 R & F Brush Machines and 1 No. 63 Oswego Automatic Cutter

DU PONT VISCOLOID CO., Inc.
ARLINGTON, NEW JERSEY

MOULDING EQUIPMENT FOR SALE:

3 Mixing rolls—steamheated
2 Grinders
15 Small Presses, 8 in. rams —12-15 Platen
1 Large Press, 18 in.—25-30 Platen
2 Hydraulic Steam Pumps
Pressure Gauges
Machine Shop Equipment:
1 Planer, 3 Lathes, 1 Miller —2 large and 2 small Drill Presses, Hack Saw, etc.
Box 81, PLASTICS, 471 4th Ave., New York.

TO RENT—Floor to rent in new two-story factory. Sprinklers, vault for celluloid; rent reasonable. Baff Mfg. Co., 15 Argyle Pl., N. Arlington, N. J.



Good Mirrors will guarantee approval of your Product

Standard Mirror Co
151 - 157 HARRISON STREET
Buffalo

FOR SALE

Have gone out of record business and have following for sale

Birmingham Press

40 Birmingham 70 ton presses specially made for us to our specifications. Only a couple of these have ever been used. Size of platen 12½"x14". 3½" travel 7½" piston. Pressure 3000 per square inch on ram.

18 Watson Stillman 70 ton presses in A-1 condition; 9 of these have a 5½" opening and 9 with 3½" opening, both with travel of about 5" on ram. Size of platen 12"x12".

One Aldrich vertical pump almost new. Capacity 40 gallons per minute, 3000 lbs. pressure.

Also steam tables, pipe fittings and valves, as well as hydraulic pipe, valves, etc., 3000 lbs. pressure.

Will consider offer on whole or part of this equipment. Write what you are interested in so we can send details. No dealers.

Watson-Stillman Press

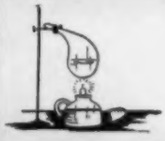
AEOLIAN COMPANY

689 Fifth Avenue New York City

Nonflammable Pyroxylin

According to a patent of William G. Lindsay of the Celluloid Co., (U. S. P. 1,616,910; Feb. 8, 1927), an non-flammable celluloid can be made by mixing pyroxylin with tricresyl phosphate. The theory is that the lithium phosphate, because of the presence of its water of crystallization will keep the celluloid cool enough if it should become ignited, to prevent the combustion from proceeding further.

The preferred proportions are 100 parts of pyroxylin, 75 parts of liquid tricresyl phosphate and 125 parts of crystalline litnium phosphate ($Li_3PO_4.H_2O$), the usual pyroxylin solvents being employed in forming mixture. The product is said to possess all the desirable ready moldability and working properties of the well known pyroxylin plastics, but without the usual combustibility.



Materials
for the Plastic Industries

NEW

PEARL ESSENCE

PASTE & LACQUERS

Our Sunlite Pearl Essence

HIGHEST LUSTRE

READY FOR DELIVERY NOW

QUALITY BEST PRICES LOWEST

Originators of American Pearl Essence Since 1917

Formerly with NEPTUNE CHEM. CORP.

AMERICAN PEARL ESSENCE CORP.

971 Nostrand Ave. BROOKLYN, N. Y. Tel. Flatbush 4840

ASBESTOS
and
CEMENT
of all grades
Samples upon request
E. Gross & Co.
90-96 Avow St.
HARTFORD, CONN.

Dipping Colors—Cements for Celluloid and Pyroxylin Plastics

Pearl Essence Lacquers

ATOM CHEMICAL CORPORATION
96 E. 10th St., New York City
Tel. Stuyvesant 7184

Manicure Steels
for mounting in handles
Nail Files
Cuticle Knives
Shoe Hooks, Pushers, etc.
Made by
C. J. BATES & SON
CHESTER, CONN.

THE **GUMS** USED
IN MOULDED COMPOSITION

must be properly selected and adaptable to your particular line of manufacture.

RESIN GUM COMPOUNDS COPAL

FRANCE, CAMPBELL & DARLING, Inc.
Importers
133-37 FRONT ST., NEW YORK

Cellu-Gummed Labels
That stick to Pyroxylin Plastics.
Also Regular Gummed and Ungummed Labels, printed, plain, embossed, die cut, Cardboard Tags, printed and blank.
Economy Ticket & Label Co.
552 7th Ave., New York City

If You Contemplate Going Into

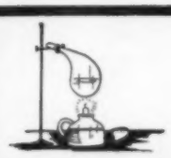
The CASEIN SOLIDS BUSINESS

An EXPERT in this field is willing to co-operate with you. Advice on installation, secret formulae. Most modern approved methods.
Also expert advice on the commercial production of casein suitable for plastic materials.

HEINRICH PREHN
Luisenstrasse 24, Naumburg-Saale, GERMANY
or c/o PLASTICS, 471 4th Ave., NEW YORK CITY

Phenol U. S. P.
Formaldehyde
Denatured Alcohol
Methanol
Whiting

WM.S.GRAY & CO.
342 Madison Ave.
New York City



Materials
for the Plastics Industries

RENNET CASEIN

BLOOD ALBUMEN
Finely Powdered

Special Grades for Making Plastics

JUNGMANN & CO.
Incorporated
5 Desbrosses St., New York

EVERY VARIETY
of
SHELLAC & GUMS
FOR THE
PLASTIC INDUSTRY
Headquarters for
COMPO-BLACK
Let us have your inquiries.
GEO. H. LINCKS
123 Front St. New York

Established 1889
The Burnet Company
John D. Newton, Pres.
96 Wall Street
New York

Importers of
WOOD FLOUR
AND
WHITING

Inquiries Solicited

Warehouse
292 Pearl Street
N. Y.

Telephone
John
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GUMS
and
RAW MATERIALS
For Moulders of
Composition Buttons Electrical Radio & Record Stock

ASPHALT—Gilsonite and Powdered Asphaltum.
COMPO BLACK—
FILLERS — Aluminum Flake, China Clay, Record Black Filler, Talc, Etc.
GUMS—A most complete line of every description.
MICA—Light and Dark—Various Meshes.
WAXES — Carnauba, Montan, Stearic Acid, Stearine and Powdered Wax.

Celluloid Polishes
TRIPOLI
White and Black Polishing Compounds

WILLIAM H. SCHEEL
Importer—Manufacturer
Exporter
179 WATER ST., N. Y. C.

Ground Pure Cotton
For use in all classes of Plastic Composition.

CLEANLINESS AND UNIFORMITY ASSURED

The Peckham Mfg. Co.
240 South Street
Newark, N. J.

A Special
Shellac
For each requirement

Henry W. Peabody & Co.
17 State St.
New York, N. Y.

Hardwood Flour,
finest quality, guaranteed made of the best birchwood only, from shipping point near Chicago.

ACME OIL CORP.
189 NORTH CLARK ST.
CHICAGO, ILL.

CELLULOSE ACETATE

Press Mass Powder

American-British
Chemical Supplies, Inc.
15 E. 26th St. New York City

HARDWOOD FLOUR
SOFTWOOD FLOUR
Granulated Cork and Flour
COTTON FLOCKS
Ground Cellulose fibre
Compositions for Plastics
Rayons and Molded Things

S. S. SPIRO
505 FIFTH AVE., N. Y. C.

CASEIN
ALL TYPES

T. M. DUCHÉ & SONS
376 Greenwich St.
New York City

Essential Books

Plastics and Molded Electrical Insulation.

Emile Hemming. 313 pages. Illustrated. $6.00.

Very special care has been taken in the preparation of the chapter on molded insulation. Contains hundreds of references to plastic and composition products and their utilization in industry.

Casein and Its Industrial Applications.

Edwin Sutermeister. 296 pp. Price $5.00. Illustrated. 1927.

Eleven authorities, many of them specialists in this field, have contributed to this volume. "Casein Plastics" is from the pen of Dr. Geo. H. Brother.

The Chemistry of the Natural and Synthetic Resins.

T. Hedley Barry, Alan A. Drummond and R. S. Morrell. 196 pp. Price $5.50. 1926.

The work of three English chemists, who are recognized authorities on this subject, one of vital interest to the Plastics Industries.

Celluloid.

Its raw material, manufacture, properties and uses.

Dr. Fr. Bockmann. 188 pages. 69 illustrations. $3.50.

In this book, the raw product, cellulose and its properties are thoroughly described. Other raw materials and methods of rendering them more plastic also receive attention.

Pyroxylin Enamels and Lacquers.

Samuel P. Wilson. 213 pages. Illustrated. $3.00

An authoritative work dealing with the materials and manufacture of pyroxylin solutions and with their application in the industry.

Synthetic Resins and their Plastics.

Carleton Ellis. 514 pages, illustrated. $8.00.

The book will serve as a guide and prove a stimulus to the numerous investigators and practitioners in the field of artificial resins. The section on plastic molding is an especially valuable feature.

Any of the above can be obtained by writing to

Book Department
PLASTICS
471 4th Ave., New York

Covering Brass With Pyroxylin

A RECENT inquiry in the Celluloid Industrie (Gummi-Zeitung), 1927, p. 2007, concerned a method for the proper coating of brass tubing with pyroxylin tubing, as is sometimes done for the manfacture of fountain pens which are to hold the ink in the tube instead of in a rubber bulb as is customary with the American style of self-filling pens.

In answer to this inquiry, a correspondent signing himself A. J., reports as follows:

The pyroxylin plastic tubes should be about 1 mm. *less* in inside diameter than the outside diameter of the tubes which they are to cover. The pyroxylin tubes are then stretched over a mandril to the desired diameter on the inside to a point where the brass tube will enter fairly freely. The pyroxylin tubes are then carefully cleaned on the inside so as to avoid spots and streaks later.

Before stretching, the tubes must be softened in hot water for about two or three minutes, and the metallic mandril must also be heated. After the brass tubes have been placed within the pyroxylin plastic tubes, the assembled structure is immersed in boiling water for from two to three minutes. This causes the plastic tubing to shrink and to lay itself snugly against the internal brass tube.

Sealing the Ends

After cooling the small discs which serve to seal the bottom can be put into place. If these discs are to be inserted into the end of the tube, the latter should protrude a little bit further over the brass tube than when the discs are to be applied butt-end fashion. The pyroxylin must, however, in either case, protrude somewhat, as there is a slight shrinkage with time, and if this precaution were not taken then the discs would eventually be forced off.

Before cementing in the closing disc, the tube must be cut off straight, preferably on a lathe for perfect work. Both parts, tube as well as disc, must be absolutely clean before being cemented together. Acetone is the usual medium employed to soften the pyroxylin plastic so that the tube and disc may be assembled and adhere together, the usual procedure being to dip the bottom of the tube into acetone until it is softened, and then to insert the disc.

After drying and hardening, the edges are smoothed with a file, and then ground smooth and polished.

BAKELITE Corporation was awarded a first prize at the recent National Industrial Advertisers Convention, at Cleveland, Ohio. The methods of approaching their markets were featured and the display included some front covers of PLASTICS.

UNTIL recently Vice President in charge of sales of the Celluloid Company, Marshall L. Havey, is now General Sales Manager of the New Jersey Zinc Company and the New Jersey Zinc Sales Co.

FOR observing the recent solar eclipse visible in England, Dr. Caroline Furness, Astronomy Professor at Vassar, used a celluloid diffraction grating ruled with 15,000 lines to the inch.

ACCORDING to a filed statement of its financial condition, the DuPont-Viscoloid Co., Leominster, Mass. had assets of $19,895,338 on Dec. 31, 1926.

MOLDED PRODUCTS

Devoted to the purchase, further use and merchandising of all manner of molded parts

Vol. 1 JULY, 1927 No. 3

Helping Washing Machine Sales

The molded component is starred as the vital selling point in Meadows Manufacturing Co. sales and advertising campaign

By A. Moses

THAT the molded component is a silent salesman for the complete product has long been the experience of many manufacturers. One such case was noted in the article "Soda Fountain Developments," in June PLASTICS. Now the molded part is being called upon to fill a new and supreme role—that of selling point *par excellence*. Such is the case with the electric washer made by the Meadows Manufacturing Co., Bloomington, Ill.

Far-flung Campaign

Through an intensive publicity campaign of nation-wide scope, this organization is aiming to reach both the individual buyer and the distributor. Says a telling caption on the front cover of a recent number of the *Electrical Record*, "To sell against the Bakelite impeller is folly."

This impeller is the crux of the campaign. Alone among the scores of electric washers on the market, the Meadows' machine has this feature and is exploiting it as the invincible selling point.

Why? Unlike metal, the vanes of this molded impeller will neither wear nor develop rough surfaces and edges. As a result, the most delicate fabrics will be washed without damage. This statement is backed up by such facts as this —less lint is formed when the molded impeller is used, other conditions remaining the same, of course.

This gentleness towards delicate fabrics is a factor to be reckoned with when the prevailing tendency towards filmy sheerness in clothing is taken into account. As a matter of fact, the Meadows Company is so convinced of the popularity of the molded impeller that it is of the opinion that in the near future, to sell a washer equipped with a metal agitator will be a difficult job, indeed.

That Intriguing Impeller

Quoting further from the advertisement referred to: "There is no single competitive feature in a washing machine today as intriguing to the feminine public as the Bakelite impeller . . . . " Truly a statement that should provide food for thought for the actual and potential user of molded parts.

Turning to the advertisements intended to stimulate the housewife's interest, we find the impeller described as *the* unique feature. In one of these the impeller is pictured as dominating the washing machine itself, and under the very bold caption "Monday Magic" proceeds to detail the many advantages confered on the machine by the molded impeller.

Impeller the Hub

Similarly the whole idea of similar advertisements in this newspaper consumer campaign is made to revolve around the "slippery Bakelite impeller."

Such positive phrases as "this amazing new feature," "the smooth,glossy, Bakelite impeller protects your clothes," "the greatest single improvement in washing machines," are used, to mention only a few. In this fashion, this newspaper publicity proceeds to elaborate the advantages to be derived from this successful example of the replacement of a metal agitator by its molded counterpart.

There is a lesson to be learned from this undoubtedly successful attempt to promote sales through the molded part in a market in which the number of competing products is remarkably high. Very large indeed must be the number of cases where the incorporation of a molded unit would serve to elevate the product above the rank and file of its competitors.

It takes but ONE of these three features to make this the World's Finest Washing Machine
Magic! Thousands of delighted women say the new Meadows washes clothes cleaner—faster—than ANY other washer they ever saw!
FREE
Meadows
To sell against the Bakelite Impeller is Folly!
The Meadows Mfg. Co.
Meadows
AY MAGIC
Meadows

Three examples of the publicity in which the molded impeller is used to promote sales of the Meadows' washer. In the center, the front cover of a recent issue of The Electrical Record; on the left and right, examples of the newspaper consumer campaign conducted in Minot, North Dakota, and Zumbro Falls, Minn., papers, respectively.

In Aviation -- where reliability is vital

THE recent successful epoch-making flights across the Atlantic have naturally reawakened popular interest in the airplane. Many airplane parts are intricate in form and liable to corrode.

Again, lightness in weight coupled with maximum strength is a consideration of the most vital importance. While metal parts have certain of these essentials, they are corrodible and heavy when compared with molded parts. The fact that molded parts have successfully come through such service as aviation demands is surely evidence convincing enough of their reliability.

Because phenol resin in its laminated form is strong, light and readily machined, this material is found in an increasing number of uses in airplane manufacture. Aside from its adaptation for propellers, there are a number of severe service uses which the casual observer does not notice.

Severe Service Uses

Planes for both army and navy are equipped with pulleys and guides for cables and with bearing spools for wing-fitting attachment bolts through spruce bars molded of phenol resin. Bakelite is used as shims for the engine attachment bolts as well.

The first two uses require parts which do not fray the flexible control cables rubbing against them. The phenol resinoid Bakelite fills this requirement better than any other material, and has displaced metal because of its resistance to corrosion, and because it causes less wear on the cables.

The engine mount shims are made of Bakelite laminated because it withstands the effects of gasoline, oil and water. These parts are used to raise the engine slightly at the attachment point to each bolt. They can

(*Continued on page 367*)

Music Turns to Composition

Plastic materials are overcoming the long-standing prejudice in favor of wood and metal on account of their ability to resist weather changes, their beauty of tone and color.

INVESTIGATIONS into actual and potential fields for molded products revealed a keen interest on the part of makers of musical instruments. This is not surprising, and for several reasons. To begin with, there is the wide use of the saxophone, the ukelele and its allies as a result of the prevalent popularity of syncopated music. Next, many musical fitments are complicated in shape, a state of affairs tending to bring the comparatively simple molding process to the fore. Lastly, many plastics possess properties both musical and beautiful, very advantageous for such parts.

One of the earliest applications was the Celluloid piano key consisting of wood overlaid with the plastic, grained to resemble ivory. In the same field come organ parts, such as keys, stop keys, tablets and pistons, many of them of such a shape as to render them amenable to hot pressing. Shellac, casein solids and the phenol resins have all found application here.

While not strictly within the province of this article, the use of pyroxylin plastic sheet for piano sounding boards might be mentioned. As described in PLASTICS, 1926, 351, such sounding boards should have resonance and tonal qualities superior to wooden laminae. Further, the fitting and tensioning processes should be simpler, and moreover, such boards should be less affected by climatic variations.

In these piping times of peace, the drum continues to set the background for concert and convivial music. The world's largest drum maker—the Leedy Mfg. Co, Indianapolis — uses pearl pyroxylin plastic to form the sides of some of his instruments, enhancing in this way the durability and color beauty of his products. As illustrated, one such drum, pearl colored, was recently added to Paul Whiteman's orchestral battery.

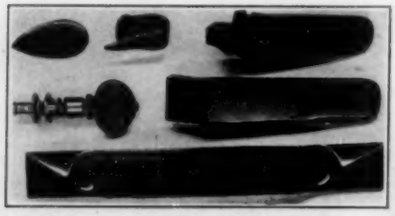
In the train of jazz, came the ukelele and its fellow instruments, a fertile field for the application of molded fittings. A case in point is the banjo-ukelele frame, molded of phenol resinoid instead of being fashioned from 4-ply maple wood strips. Not only are a number of manufacturing operations eliminated, but there is a notable reduction in the time of assembly. Other benefits derived are better tone, higher surface luster, greater dimensional accuracy and less climatic effect. The Fred. Gretsch Mfg. Co., Brooklyn, N. Y., have adopted these rims.

No less important, if smaller in size are the fittings for string instruments. Bridges and tail pieces, chin rests and mutes, pieces of ornate and involved form, are all fit subjects for

Two of the chief organs of Jass—banjo-ukelele with rim molded entirely of phenol resin, saxophone with molded phenol resin mouthpiece. Photos courtesy Bakelite Corporation.

the artificer in pyroxylin plastics. With these materials, the production of pearl and other effects and vivid colors, the latter the dominant note among current tendencies, becomes a comparatively easy matter.

Ebony, for long regarded as unequalled for castanets and the like, has now to reckon with the phenol resins as rivals. Not



An assortment of musical fittings pressed from pyroxylin plastic comprising picks, organ keys, banjo string key and guitar bridge.

only are the latter dense, uniform and notably resonant, but they are also sanitary non-absorbent, and unaffected by weather changes.

That other organ of jazz, the saxophone, has not escaped the attentions of the promoter of molded products. Here, and on other members of the musical species, the molded part for mouthpieces and key-rollers has certain advantages to offer. Why is the mouthpiece molded of phenol resin replacing that made of ebony? Because the process of manufacture could be simplified with an assurance of uniformity. Other considerations are the sanitariness, non-warping and absence of weather effects. Key-rollers are used on certain keys of saxophones and clarinets most fingered during rapid rendering. Better results are obtained than with metal or porcelain.

Although making no claim to completeness, a story such as this should include the parts

More pyroxylin plastic fittings comprising a clear amber banjo key, guitar bridge pin (lower right corner), banjo bridge and tail pieces for string instruments.

used on mechanical musical instruments. The gramophone record immediately comes to mind, a product which today as at the very first is still being molded of shellac. Music roll ends and the valve lifts on player pianos are other examples.

While its note cannot be described as essential to musical symphony, there is one molded wind instrument which should not be omitted—the duck call. It really belongs to the realm of sport but this appears to be a convenient place to mention it.

From the decorative point of view, the laminated phenol resins offer promising possibilities. As a veneer for wood, they could be utilized for piano panels, for instance.

In conclusion, wood and metal had a very good start, and for long have held sway in this domain. However, as in other

Pearl pyroxylin-sided drum, one of the instruments used by Paul Whiteman's orchestra and made by the Leedy Manufacturing Co., Indianapolis, Ind.

industries w,ith the dissemination of information on the valuable properties of the plastic compositions, the prejudice in favor of wood and metal should become less and less marked.

Rayon Spinning - rubber and metal replaced

SO widely ranging are the applications of molded products—literally from duck-calls to cafeteria tray-tracks—that it is not surprising to find such parts in use in the textile industries for example.

The widespread demand for well-displayed sheer hose has naturally brought rayon or man-made silk to the forefront. In its manufacture by the viscose process, the rayon filaments after extrusion are twisted into threads. To spin and further dry the filaments they are fed vertically into a rapidly revolving bucket. It is this bucket, box or pot, as it is variously called, that is molded of the phenol resinoid Bakelite.

One form consists of a cylinder, wall thickness 5/8", 6" diameter, 4" high, provided with a smaller base connected with a bronze bushing for attaching to the driving spindle.

Here the thread collects into the annular cake, a ring-shaped mass, weighing about one lb. Perforations in the walls of the bucket allow of its action as a centrifugal extractor, freeing the thread from residual acid and water.

This application, by the way, is a further example of metal replacement. Formerly, these buckets were made of rubber-lined aluminum, but the molded part was found better to fulfill the following requirements: (1) mechanical strength coupled with dimensional truth, as other

(*Continued from page 369*)

Ordering On Confidence

By *Van Sylman*

No. 2. Adventures of Tom Tompkins Salesman for the Super Mold Corporation.

"WHERE to go?"—"Where to go?"—"Where to go?" The words turned into an aggravating refrain. "Where to go to get an order" was the further horrible chorus that sang in his mind. He thought, that of all sad words of tongue or pen, the saddest are these, "Where to go to get an order."

He considered every possible prospect that he had called on in the past few weeks. Not a one could be closed now. He fingered over the copy of every quotation he had made and not a one but had been canvassed to death.

Assuming that luck might play a part in this situation, he wisely decided to give it a chance; banged his desk shut and went to lunch.

The Call

It wasn't fifteen minutes after he had left that his 'phone rang and a message was left—'Mr. Tompkins was to call on Mr. Macey.'

"Now what does that crotchety old fellow want," thought Tompkins. "He hasn't given us an order in a year." But he didn't hesitate in going right on down to see him.

When he was shown into the office of the purchasing agent of the International Specialty Co., he found him examining a drawing and specification sheet.

"Well, how long do I have to wait for you," was the greeting. "Never mind, here is an order. When can you make delivery?"

In amazement, Tompkins took the order and the specifications, carefully looked them over and found that it was for a molded part his company had never made before. Most astounding of all, he could find no price on the order.

"Do you want us to figure out the price on this and quote before going ahead?", he asked.

Quoting Dispensed With

"I haven't said anything about quoting, have I?"

"No, Mr. Macey, you haven't. But it seems the customary thing that every buyer wants us to do."

"Well, young man, I don't. If you don't want it that way, don't take it."

"Of course, we'll take it that way, and mighty glad to get it. But if I am not presumptuous, might I ask just why you are giving it to us without our advance quotation?"

"You are presumptuous," growled Macey, "and I don't know why I should, but I'll tell you anyway."

"The last time you people made a quotation, I thought you were too high, so I had several other molders quote too. I got a price a good bit under yours and placed the order.

I had trouble with that crowd right from the start. They didn't properly understand our specifications and lots of valuable time was taken up in going over them from time to time. The delivery was delayed and everybody in our plant was holding up work waiting for these parts. When they did come, the delay and annoyance ate up the saving in cost.

After that, I was pretty careful that my next order was placed with a concern who knew what we meant when we wrote something in an order. I still thought you people were high priced so didn't call you in.

Price Not Everything

We got a good price alright, but this molder didn't know how to make his dies. He used cheap steel so his parts did not fit and naturally turned out a large quantity with burrs or fins on their edges. Even when he took these off, the piece showed the defect, so many had to be rejected with a consequent slowing up of production. Then he did not place our raised lettering properly so that when he polished the piece he destroyed the letters. New molds had to be properly made, and he wanted us to pay for them.

Yes, young fellow, I hate to

(*Continued on page 375*)

Further significant episodes from the adventurous career of Tom Tompkins, salesman for molded products, will be described in early issues.

Primary Considerations in Design

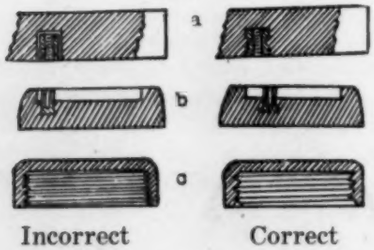
II More hints for the buyer when designing his own parts

THAT metal inserts can be embedded during the molding process itself is one of the important advantages of molded products. In designing such parts, the following considerations should be borne in mind: (1) The insert should be indented so that it gets a better hold with less liability to fall out. For this purpose, flattening the head is also effective. (2) In positioning the insert, care should be taken that the latter is not too near an edge as otherwise there will be a tendency for the insert to shift when the pressure is applied during the molding process.

Knurling

A form of straight knurling should always be used, for as has already been pointed out, (PLASTICS, June, page 235), a cross knurl means a complicated mold. In designing a socket, dial or some such part as that illustrated, with a milled rim, care should be taken to "step" the rim. This is advisable for the production of a well formed knurl. In designing handles, if a simple knurl

Fig. 1



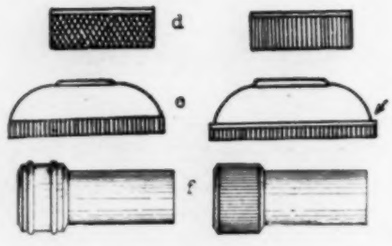
Incorrect Correct

(*a*) *With insert shaped as on the left, it will tend to fall out.*

(*b*) *Insert on left is placed too near an edge.*

(*c*) *Pitch of screw thread should be as large as possible.*

Fig. 2



Incorrect Correct

(*d*) *Cross knurling should be avoided.*

(*e*) *Parts like this should be "stepped" as at arrow.*

(*f*) *Wherever possible avoid knob like that on left.*

Diagrams from Heming, "Plastics and Molded Electrical Insulation," courtesy Chemical Catalog Co.

lige that shown on the right, Fig. 2f. will do, parts such as that at the left should be avoided.

The pitch of screw threads should be as large as possible, as with a larger thread, the distortion on shrinkage will be reduced.

Walls should be as thick as possible and it is better not to specify walls less than 1/16" thick. This will apply to phenol resin and other hot-molding compositions in particular. Right angled or curved tubular pieces should be avoided as without adding complications to the mold, such parts will be difficult to remove from the molds.

(*Continued on page 375*)

Saving Through Simplification

$400,000 annually on Insulators

AT a recent conference held under the auspices of the National Committee on Metals Utilization of the Department of Commerce, decisions of much interest were reached.

It was agreed to discontinue 62 varieties of one-piece porcelain insulators out of 272 at present in production. This elimination will be put into effect gradually, and will eventually result in a saving of some $400,000 annually.

Although only porcelain insulators are involved here, there can be no doubt that savings of importance could be effected in the field of molded electrical products.

As competition cuts prices, the usual practice is to cut down production costs and to enlarge sales volume, with a consequent increase in the cost of distribution. In spite of these efforts the actual net profit may even be smaller.

Adding another member to its line of products is regarded as the best way to get more business and to increase profits. This custom would give better

(*Continued on page 371*)

"Molded Parts on the Automobile"

in an early issue.

Scranton Parts

Parts like the above insulator must be perfect to the hundredth part of an inch.

Here in the largest plant of its kind, Scranton turns out millions of such parts in Phenolic, Bakelite or Lacanite. Each piece must pass a test of exact thoroughness before it can leave Scranton's plant.

The Scranton Button Co.

SCRANTON, PA.

Western Representative, Gordon D. Wilson
645 Washington Boul., Chicago, Ill.

Arthur Wiseburn, Manager
New York Office, 50 Union Square

Ohio Representative, J. E. Black & Co.
The 4900 Euclid Bldg., Cleveland, Ohio

The Guest Room Up-to-date

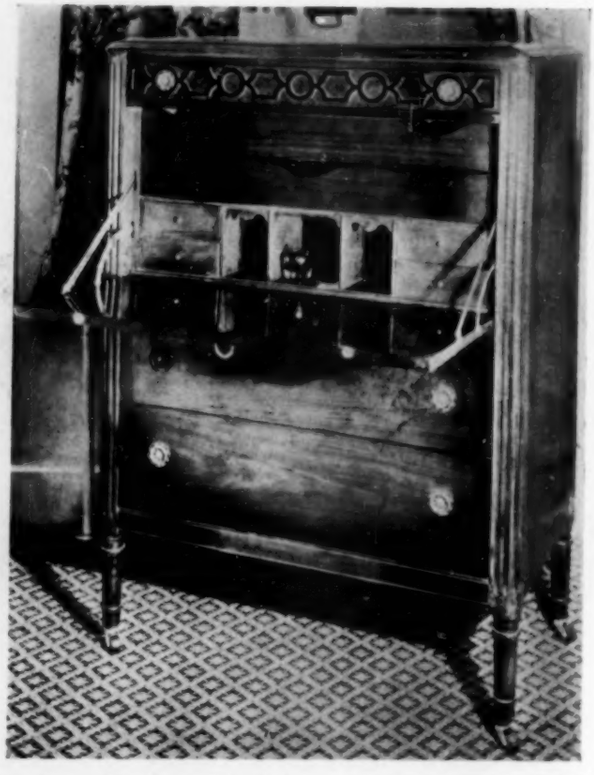
Phenol resin furniture fittings now grace the most modern hotel rooms

STRANGELY enough, this period of Prohibition has added a new usefulness to the laminated phenol resin Bakelite. Owing to the prevalent practice of privately partaking of alcoholic beverages of pre-Volsteadian strength, a need arose for a furniture finish resistant to such liquids. Laminated Bakelite is such a material.

In this connection, the chiffoniers installed as part of the guest-room furniture in the Hotel Manger, New York City, come to mind. These have convertible writing tops made of Bakelite and according to recent observations, the phenol resinoid makes an effective surface protection. In fact, the writing surface is showing less signs of wear than the other parts of the chiffonier. H. Craig Severance, the architect, specified these desks.

The laminated phenol resin Micarta finished to resemble green Carrara marble is being used on soda fountain panels. This material, which also comes in a variety of wood finish effects, consists of laminated phenol resin coated with resin-impregnated lithographed paper.

The present vogue of furniture built almost entirely of steel will naturally tend to arouse a wish for non-inflammable fittings. Composition materials will no doubt contribute their quota towards its fulfillment. For furniture sliders, escutcheon plates, handles, chair arms and toilet seats molded of phenol resin are already with us and many similar applications are foreshadowed.



Chiffonier with phenol resin writing drop as installed in Hotel Manger, New York

"Beaudon Voile"

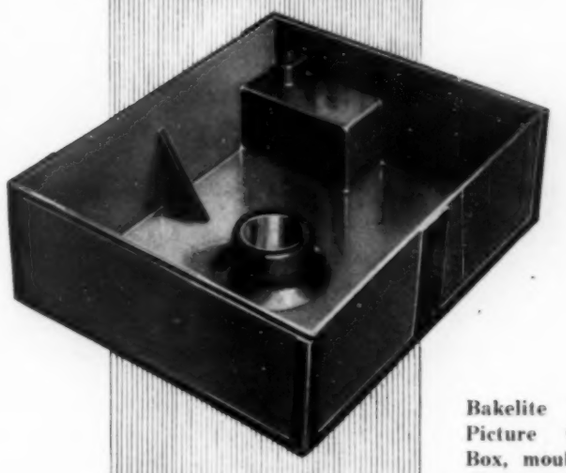
A Bakelite Beaded Fabric

On another page of this issue, there appears a picture of a girl purporting to be completely clothed in casein products. Presumably, also, the ornamental work on her dress has a casein basis.

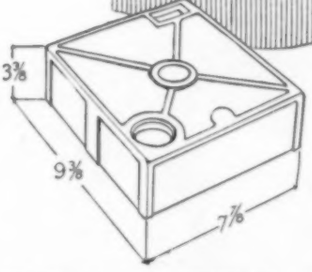
The synthetic resin Bakelite has found such an application in the production of "Beaudon Voile," a fabric with a beaded design. And this is its remarkable feature—the beads consist of a special form of Bakelite of variegated colors.

The beads are not sewn on, but attached directly to the fabric by a special process. As the material of the beads actually flows around the fibres to some extent, there is very little tendency for them to become detached during laundering. Further, the fabric may be ironed without dire results ensuing.

PLASTIC MOLDING



Bakelite Motion Picture Camera Box, moulded by Shaw



IF YOUR JOB is one that requires expert craftsmanship, if your molded parts must be perfectly made and finished to the highest degree of accuracy, it will pay you to consult Shaw.

In other words, if your first consideration is to procure quality molding you need a quality molder.

Producers of the finest in moulded parts for thirty-five years.

SHAW INSULATOR CO.

IRVINGTON, NEW JERSEY

Established SHAW 1892

Metal-reinforced Molded Steering Wheel

An example of the simplification possible through molding a part of complicated structure

HUNDREDS of objects which were formerly made of metal, or of metal and wood, and which required innumerable separate cutting, shaping and assembly operations can be much more economically manufactured by methods involving some process of molding. An excellent example is one of the various patented methods for producing molded steering wheels, either of a vulcanizable hard-rubber type of plastic, or from any of the hardenable phenol resins and similar materials.

Mr. John R. Gammeter in his U.S.P. 1,595,082, assigned to the B. F. Goodrich Co., describes a method of making a molded steering wheel, as shown in the illustrations which accompany specification.

In these drawings:

Fig. 1 is a plan view of a steering wheel made in acordance with invention in its preferred form, a part being broken away and in section.

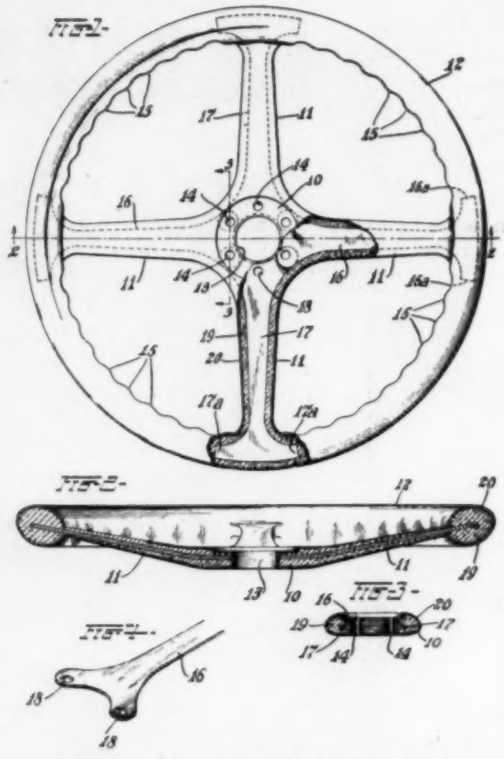


Fig. 1—The steering wheel in plan showing method of inserting metal reinforcements.
Fig. 2—Section along line 2-2 in plan view.
Fig. 3—Section through hub (on line 3-3 in plan).
Fig. 4—Hub end of metal reinforcement.

Fig. 2 is a section on line 2—1—2 of Fig. 1.

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary perspective view of the hub end of the reinforcement members.

Construction Described

Referring to the drawings, the wheel comprises a hub portion 10, spokes 11, 11 radiating therefrom, and a rim 12, these parts being formed integrally with each other of a moldable material, preferable cellular ebonite or hard sponge rubber. The hub portion is formed with an axial aperture 13 adapted to accommodate the upper end of a steering shaft, and with a circumferential series of smaller apertures 14, 14, disposed at equal intervals around aperture 13, to accommodate the bolts for securing it thereto. If desired, the rim 12 may be formed with corrugations 15,15, on its inner periphery to enable it more firmly to be gripped.

Imbedded within the respective spokes 11 are metallic reinforcement members 16, 16, 17, 17, each of which is formed at its outer end with respective lateral projections 16a, 17a, lying within the body of the rim portion 12. The inner end portion of each of the reinforcement members is branched or formed with a head and formed with an arcuate end face or edge concentric with the axial aperture 13. The branches of the portions are rounded and formed with perforations 18,18 registered with the apertures 14 the heads of members 17 being of such width as to be formed with three such perforations and to overlap the branches of the members 16, so that the perforations in the overlapped portions register. Thus the reinforcement members are held securely together when attaching bolts are in place in the apertures 14, and the aperture 13 is thus provided with a complete, circumferential metalic reinforcement.

Advantages of Molding

Because of its light weight and relatively great strength, this wheel of hard, cellular rubber 19, with a surface coating of dense, hard rubber 20, the latter being available in various colors so that a wheel of attractive or appropriate appearance may be produced. It will be understood however, that other moldable materials may be substituted.

In producing the wheel the metal reinforcements are stamped from sheet metal, assembled in the relation shown, with a covering of moldable material, in a mold, with suitable mandrels or dowels in the apertures 18 adapted to mold the apertures 14, and thus mold the wheel, of course vulcanizing it in the mold in case a vulcanizable material is used. The overlapping feature at the inner ends of the reinforcement members permits them to be stamped from small sheets with much less waste

would occur if they were all stamped integrally and yet they are adapted to be firmly secured to each other in use, providing a rigid hub structure. The extension of the reinforcement members circumferentially in the rim portion serves to brace and give strength to the structure as a whole.

It is quite evident from the preceding, that similar methods are available for the fabrication of many other articles of commerce. Examples are "straps" for street-cars, handles for large doors, pot and kettle handles, tool handles, golf-club heads etc.

Auto-Bumper as Antenna

BY the use of the phenol resin Bakelite in its laminated form, the bumper can now function as "aerial." The problem was to find an insulator that would withstand hard usage and in other ways meet the conditions of service.

In this connection, it might be reiterated that the laminated material is not affected by temperature changes nor by gasoline oil or water, conditions liable to arise in use.

Strips of the laminated product are secured to the brackets, thus effectively insulating the bumper aerial from the chassis-frame of the car.

The receiving set is fixed behind the dash board, the loud speaker being secreted underneath the driver's seat. The car is a Marmon, and according to advices, the reception leaves nothing to be desired.

Composition Fans

LAST month mention was made of the silent running electric fans with blades made of the laminated phenol resinoid Micarta. These non-reverberating appliances come in black and old ivory and show every sign of being very popular this season. The Westinghouse Electric Co. are the makers.

Their superiority over metal-bladed fans for ventilating laboratories, chemical and similar plants should not be overlooked.

Moulded by
Kellogg
your guarantee of Quality

Kellogg Moulded Tube Socket

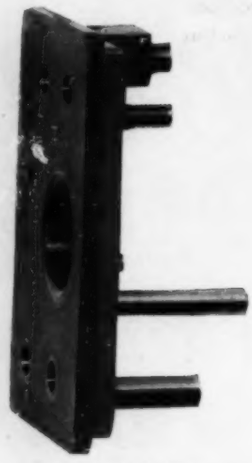
The fine finish and extreme accuracy you require in moulded Bakelite and similar products are characteristic of parts *moulded by Kellogg*. These qualities are the logical result of long experience in making precision moulds—and in the moulding of intricate pieces for a wide variety of industries.

The complete engineering, designing and moulding facilities of the Kellogg plant are at your command, to help you with your problems, to insure deliveries on time and to keep down your production costs.

Kellogg Moulded Distributor Part

May we quote on your moulding requirements?

Kellogg
SWITCHBOARD & SUPPLY Company
1066 W. Adams Street
CHICAGO, ILL.



Switch Base

MANUFACTURERS CUT YOUR COSTS WITH CHICAGO-BAKELITE

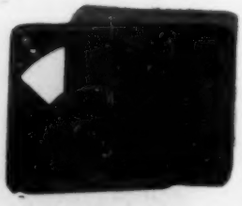
The illustration at the left shows how we help manufacturers.

37 Operations Saved

on one small article.

11 drilling, 11 tapping, 15 assembling operations completely eliminated. In this single piece there are 11 inserts rigidly imbedded in a beautiful green colored, polished Bakelite base.

CHICAGO-BAKELITE PAYS BACK ITS COST
by Eliminating Machine Operations



Ammeter Case

The lower illustration shows an Ammeter Case which is completely finished ready for the delicate mechanism to be assembled. The sturdy Bakelite base and cover is moulded with inserts and holes to precise dimensions that insure accuracy of operation of sensitive apparatus.

These manufacturers have greatly reduced manufacturing costs with Chicago-Bakelite.

Replace Your Expensive Metal Parts with Permanent, Lustrous Finish Chicago-Bakelite

Our engineering department will help solve your production problems. We are the largest custom Bakelite Moulders in Chicago, with a modern factory equipped with the Finest Moulding Machinery and Hydraulic Presses operated by high pressure steam.

Tool and Die Department

Our long experience in building Bakelite moulds for others, also dies and tools, careful attention to details, specific accuracies, scientific heat-treating, polishing to mirror finish insures the finest quality moulded parts. Our modern precision machinery insures immediate service.

Write Us for Prices

Your inquiries will receive immediate attention. Day and Night service in moulding department insures highest quality and volume production at most reasonable prices. Just send us a sample, print or specifications of what you desire. Quotation will be sent you by return mail.

Judge Us By the Manufacturers We Serve

Know a man by his associates is an adage of long standing. This is just as true of Business associates. Below we give a few of the manufacturers we have served either in our Bakelite or Die and Tool departments. We can help you too!

Western Electric Co.
Stewart Die Casting Co.
Electric Household Utilit. Corp.
American Can Company
Johnson Service Co.
Simmons Bed Company
Meadows Manufacturing Co.
Zenith Radio Corp.
Mantle Lamp Co. of America
Conlon Washing Machine Corp.
Tokheim Oil Tank & Pump Co.
Addressograph Company

WE USE ONLY GENUINE BAKELITE POWDERS

Chicago Moulded Products Corp.

SUBSIDIARY TO
PLYMOUTH MANUFACTURING CO.

2150 W. WALNUT ST. CHICAGO, ILL.

This Month's Problem

Wanted—A Molded Product To Replace Clay

VERY numerous have been the inquiries submitted since the advent of *Molded Products*. Many of these indicate new and often strange uses and are of sufficient interest to merit treatment in these columns.

The Problem Stated

"Is it possible to mold an electric flat iron plate holding and insulating a wire resistance unit?"ran one of the queries with which we were bombarded. The part under discussion is at present being made of porcelain or some other clay mixture, and must not only be heat-resisting, withstand a temperature of 900° F, but must also be fairly resistant to shock.

The electric flatiron part under discussion

So drastic were the conditions the product must meet that at first blush there seemed little chance that the molding compositions at present in common use would serve. To begin with, there was the question of price competition with porcelain and other ceramic materials to be considered. This rules out a number of products. Then the high temperatures to be faced

put another group of compositions out of the running. A third type was eliminated owing to its inability to withstand the sudden temperature changes incidental to the operation of the flatiron.

In the end, the solution to the problem rested with two materials. One was a cold- molding proposition, the other a material differing essentially from the organic molding compounds. The names of these and their manufacturers will be supplied to those interested.

The manufacturers of the former product claim it is already in wide use on numerous similar molded parts. The latter product is rather unique. It is fireproof, does not smoke on heating up, is strong, nonconducting, and would seem to be cut out for the job under discussion.

Airplane Parts

(*Continued from page 356*)

withstand considerable amount of pressure and help to eliminate vibration of the engine.

In the wing-spar bearing-spools an interesting use for phenol resin is found. A noncorrosive material which is strong and light in weight is needed here. Metal which can withstand the wear is both too heavy and corrodible. The phenol resinoid Bakelite fills the need by affording the additional bearing strength—greater than wood without adding too much weight.

An airplane is subjected to extreme and rapidly changing air conditions—very dry at high altitudes; clouds and rain; sudden variations in heat and cold. Such service is hard on metal, tending to cause repeated expansion and contraction, not to mention corrosion. Still harder is the service on wood and ordinary fabrics. The phenol resins by reason of inherent physical and chemical properties, seem to provide at least a partial solution to the problem.

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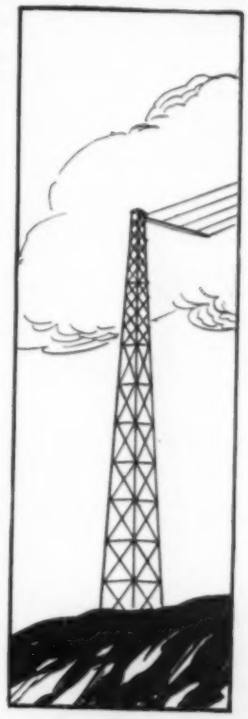
Members in
American Institute Electrical Engineers
Society Automotive Engineers Radio Manufacturers Association

NORTON
Moulders of Plastics



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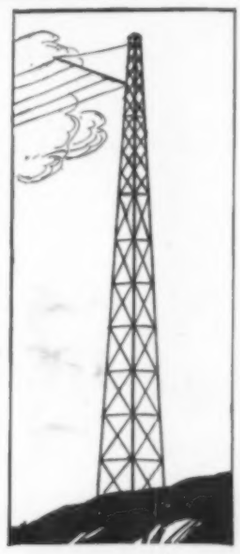

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Composition Without

PHENOL resin compositions are notably resistant to heat. Metal fittings can be affixed during the molding process itself. Complicated and ornate designs can be executed in a minimum of operations. These features account for the growing popularity of the molded handle as compared with the same part made of wood.

By a method recently described, the handle of a percolator or flatiron can be attached without tools. Renewal is thus facilitated. Moreover, the attachment inserts have a certain play, for some purposes, a desirable feature.

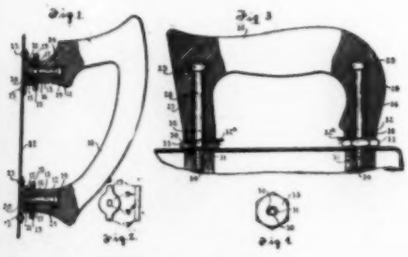

Fig. 1—Percolator handle.
Fig. 2—Wrench for fitting above.
Fig. 3—Handle for electric iron.
Fig. 4—Nut for fitting handle to iron.

Fig. 1, represents a vertical sectional view of a percolator handle; Fig. 2, the wrench members (17) used for attaching the handle to the percolator. The latter are placed on the cut away portions (16) of the attaching members (13) and the nuts (20) engaged with the threaded portions of the latter. The cap (21), itself riveted to the percolator, prevents the nut from rotating. By means of the wrenches (17) the threads on the members (13) are fed into the nuts (30), thus clamping the head (14)) against the shoulders (24).

For this purpose, the fastening plugs (13) must be freely

Handle Fitted Tools

rotatable after embedding. This is accomplished in this way. Before moulding, the plugs (13) are coated with an alloy of suitably low melting point. This is melted out after the molding process leaving the requisite clearance.

Ftting to Flatiron

For a flatiron (Fig. 3) the fastening members are of similar construction. To their ends are attached metal ferrules (32) which bear against the threaded attaching nuts (3). The latter (Fig. 4) can be knurled for turning by hand.

In the case of a flatiron-handle, the fastening plugs are made longer and stronger so as to reinforce the handle. By gradually increasing the thickness of the coating of fusible alloy in the direction of the iron, there will be sufficient clearance left for the relative adjustment of the handle and iron especially if the head (14) is spherical.

This idea is the subject of U. S. Patent 1,599,924, dated September 14, 1926, and issued to John B. Sanborn, Evanston, Ill.

Rayon Spinning

(*Continued from page 358*)

wise destructive vibration would soon occur as a result of the high rotational speed plus lack of symmetry; (2) resistance to attack by sulfuric acid and carbon bisulfide, chemicals used in the process of manufacture; (3) no possibility of imparting color to the silk.

Compounded with graphite, resinoid is molded to form a bushing for a high speed bobbin spindle. Laminated, it forms silent gears, and the vanes of rotary acid-resisting pumps used in this industry.

JULY
THE Electrical Industry—Where the utmost exactness and precision is a necessity.
Below are some of the complicated parts Auburn has turned out for this trade, perfect, well finished and exact. Only an organization built up in over half a century of moulding can produce such pieces.
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In the Dental Spotlight

ON account of their sanitary qualities, non-inflammability, and warmth to the touch, the use of products molded from the phenol resinoids is expanding in the field of dental and surgical accessories.

Such molded products as dental and surgical chair arms, and wound shields have already received attention in these columns. The most recent addition to their rapidly growing ranks, is the dental spotlight.

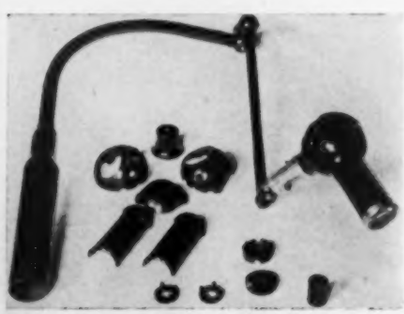
Intricate Components

As depicted, the spotlight consists of a number of components, many of them of intricate form and with thin walls, fit subjects for the molder's art.

Lamp tube, battery container shells, battery holders are all better products when molded.

These parts must not only be non-absorbent, but must be able to withstand the chemicals of the sterilization bath without deterioration.

The insulating properties of the phenol resins give them a decided advantage over metal for a purpose such as this.



The spotlight with its numerous intricate parts.

The pyroxylin plastics have long been used for artificial dentures. Phenol resinoids are also being applied to this purpose. Far-reaching claims are being made for such dental structures. This use will be discussed in an early issue of PLASTICS AND MOLDED PRODUCTS.

A Grease-Less Gear Drive

GEARS made of one of the laminated phenol resinoid products have long been in use. By obviating metal-to-metal contact, they operate more silently. Where there is a liability to corrosion from fumes or chemicals, they will outlast metal gears. As they are very resistant to heat and moreover are non-absorbent, they can effectively replace rawhide and fiber. Hence their wide use in motors driving pumps, drills and many other types of machinery.

The "Screenograph"

The use of the automatic film projector for advertising purposes is growing rapidly. Such machines must run for long periods without attention. In one of these, the "Screenograph," there is a gear made of the phenol resinoid Bakelite. It engages with the drive and works silently and without lubrication. The last feature is important, as all possibility of contaminating the film with grease is thus precluded.

Simplification

(*Continued from page 360*)

this custom would give better results if, at the same time, some item with a slow turnover were discontinued. In the end, the inventory piles up with dead items, manufacturing costs go up and selling efforts become diffused.

Diversification in any line adds to both production and selling costs. Standardization or more correctly "simplification" reduces these costs.

An active line of products, without dead weight, production and sales in large volume, mean good annual net profits. But it requires courage to simplify rather than to diversify.

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Port-Hole Fitments of Pollopas

A CONDENSATION product of urea and formaldehyde, pollopas is a transparent, colorless material, resembling rock crystal or flint glass in brillancy. As it is able to resist concussion due to gun-fire better than ordinary glass, it is being used in Great Britain for port-hole fitments. Its use in windshields is also being investigated as in addition to more resistance to shock there should be little danger from splinters.

Properties

At 200° C. it chars but does not burn or melt. However, in its present state of development, pollopas can be scratched very easily, but further study may succeed in eliminating this drawback. As has been mentioned previously in these columns, this novel material is the discovery of Drs. Fritz Pollack and Kurt Ripper working in collaboration in Vienna. The export to this and European countries of this promising product is still on a small scale, according to a report from our Consul at Vienna.

Pollopas Limited

Pollopas Limited (a private company with headquarters at Nottingham, England, has recently been formed. The nominal capital will be 275,000 pounds sterling and the Company purposes to enter into an agreement with Dr. F. Pollak, Kunstharzfabrik, Dr. Fritz Pollak G. m. b. H. and others with a view to the acquisition of the trade-mark Pollopas, covering a transparent urea-formaldehyde condensation product of Austrian invention.

Prystal, a French analogue of Pollopas, is described on page 324 of this issue.

Patent Agreements Help Stabilize Radio Industry

AN occurence of considerable importance, though perhaps somewhat indirectly, to the plastic industry, is an agreement which was reported to have been reached on March 12th of this year, between the Radio Corporation of America and the Zenith Radio Corporation.

This means an end to the long outstanding and bitter legal controversy over the radio patents held by the Radio Corporation, and as it is understood that similar arrangements are pending with other concerns, presages an era of greater prosperity and greater certainty in this so important industry.

Development instead of Litigation

The money now wasted in litigation can better be expended in research and development work and as the sale of radio sets, tubes and parts increases, there will be just that much more work for the molder—both custom and those who "mold their own." All this will reflect back in increased business for the producers of the molding products.

It is understood that the arrangement between the companies above mentioned involves a recognition of the validity of the patents held by the Radio Corp., and the payment of 7½% royalty, for future use as well as for past infringement. According to some statistics compiled by the McGraw Hill Publishing Co., 218 million dollars worth of radio sets, at wholesale prices, were sold from late in 1922 to the end of last year, and the sales for the present year are estimated at 96 million dollars.

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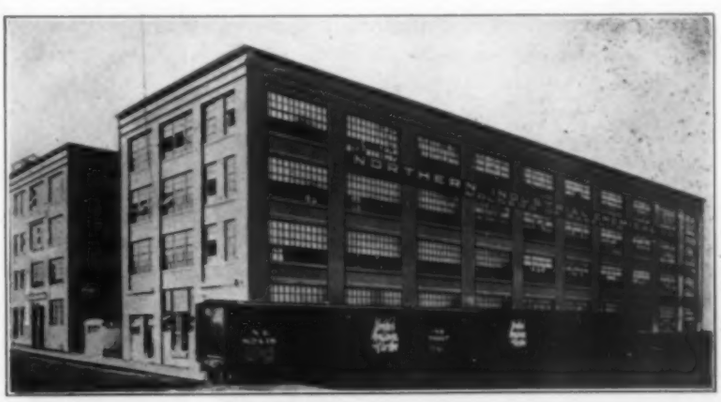

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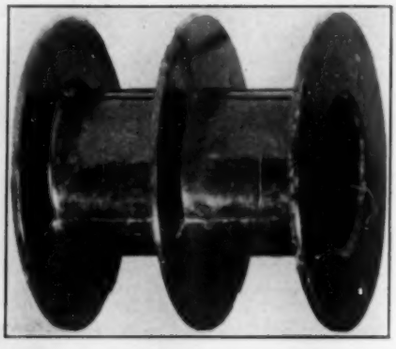

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Two Plastics Combined to Mold One Part

RECENTLY there have been many tentative developments in the direction of combining plastic materials. In view of their diversified properties, the resultant products should have interesting qualities. For instance, a process has been protected for combining rubber and cellulose acetate. Vulcanized fiber is being used as a filler in a phenol resinoid composition.

From time to time, various laminated phenol resin products have been described in these columns. Now the casein solids are to be made in a laminated form. These new products are scheduled for description at an early date.

Combining Phenol Resin With Casein Solids

It is supposed to be a difficult matter to obtain the phenol resinoids in a pure, permanently white, form. Where the product need not be white throughout its mass, that is, where a white surface layer will suffice, the phenol resinoid may be coated with a layer of some white plastic material. Variegated effects should also be possible.

Applications

A case in point is the phenol resinoid push-button with a disc of casein solids inserted. The process of successfully combining the two materials has not been without its difficulties. If too high a temperature is used during the process, there will be a tendency for the casein to discolor. An interesting development would be a domino consisting of a molded phenol resin base with raised spots, covered by a layer of casein solids arranged to fit over the spots.

Ordering on Confidence

(*Continued from page 359*)

admit it, but I was foolish not to continue doing business right along with a concern I knew. I guess, in the molding game, experience counts for something and as we've given you orders for over ten years, and gotten satisfaction, we may as well keep on.

I'm not afraid of you treating us right on the price, for you want our business and I imagine you know what you are doing down there. I guess you will figure honestly after you get the order as well as before; but if you don't, watch out. Now get out and put that job through."

Tompkins got. And while he wondered at the inscrutable ways of Providence, he couldn't help but feel admiration for the old fellow who was honest enough to admit he had been wrong.

Design Hints

(*Continued from page 360*)

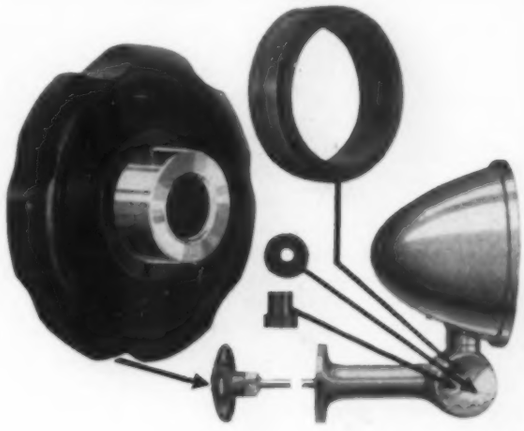
Holes should be given as large a bore as possible as an over-narrow plug will be hard to "knock-out."

Relief lettering or designs on a molded part are to be prefered to similar engraved effects and for this reason—it costs less and it is simpler to sink the lettering or design into the mold than to form the raised processes.

Tubular parts are best avoided and where used should be made as thick as possible. With the phenol resinoids and other hot molding compositions there is a pronounced shrinkage in use, an effect which causes the part to bind with the core, making it unsafe to dislodge the latter if the walls are less than 1/16 inch thick.

Walnut Bakelite Handle with Threaded Nickel Insert—Brass Collar Molded in Bakelite Ring to insulate and form a press fit—Bushings are also a press fit in a drilled hole.

Molds Were Made and Production Started In Three Weeks



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BAKELITE CORPORATION

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